THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—20TH YEAR. SYDNEY, SATURDAY, APRIL 15, 1933. No. 15.

Table of Contents

[The Whole of the Literary Matter in THE MEDICAL JOURNAL OF AUSTRALIA is Copyright.]

ORIGINAL ARTICLES— PAGE.
"Shark Attacks in Australian Waters", by VICTOR COPPLESON, M.B., Ch.M., F.R.C.S., F.R.A.C.S. .. 449

REPORTS OF CASES—
"Carcinoma of the Appendix in a Girl Aged Nineteen", by SYDNEY ALLEN, F.R.C.S. 467
"Plane Tree Leaves a Cause of Seasonal Asthma and Hay Fever", by DAVID ZACHARIN, M.B., B.S. 467

REVIEWS—
Vocational Guidance 468
Phylaxis 468

NOTES ON BOOKS, CURRENT JOURNALS AND NEW APPLIANCES—
The Medical Quarter of London 468

LEADING ARTICLES—
Air Travel and Quarantine 469

CURRENT COMMENT—
Alcohol and Drug Addiction 470
The Mortality from Hæmatemesis 471

ABSTRACTS FROM CURRENT MEDICAL LITERATURE—
Morbid Anatomy 472
Morphology 473

SPECIAL ARTICLES ON TREATMENT— PAGE.
Treatment of Iritis 474

BRITISH MEDICAL ASSOCIATION NEWS—
Scientific 475

MEDICAL SOCIETIES—
The Medical Sciences Club of South Australia .. 475

OBITUARY—
George Cuscaden 476
Arthur Francis Lynch 477
Robert Humphery 478

UNIVERSITY INTELLIGENCE—
The University of Sydney 478

CORRESPONDENCE—
An Economic Commentary and Diagnosis 478
Modern Optometry 479

BOOKS RECEIVED 480

DIARY FOR THE MONTH 480

MEDICAL APPOINTMENTS VACANT, ETC. 480

MEDICAL APPOINTMENTS: IMPORTANT NOTICE 480

EDITORIAL NOTICES 480

SHARK ATTACKS IN AUSTRALIAN WATERS.

By VICTOR COPPLESON, M.B., Ch.M. (Sydney), F.R.C.S. (England), F.R.A.C.S.,
Honorary Surgeon, Saint Vincent's Hospital; Honorary Surgeon, Royal North Shore Hospital of Sydney.

ALTHOUGH the distribution of sharks is almost world-wide, they would appear to be dangerous to man only in the warmer waters between latitude 40° north and 40° south. Attacks on man have been reported from Port Elizabeth, South Africa,[1] Calcutta,[2] Colombo, Aden,[3] Port Said,[4] Haiti,[5] Ellice Islands, Hawaii, Philippine Islands,[6][7] Porto Rico,[8] Panama Bay,[8] Cuba,[8] Tampico, Mexico,[8] Natuna, Dutch East Indies,[8] New Guinea, Thursday Island,[11] and Australia.[9–17]

Sharks have existed since early geological times, and fossil teeth, some of which are ten centimetres (four inches) long, have been found in all parts of the world. Since ancient times it has been known that they will attack man. Herodotus[18] describes "sea monsters" (which were in all probability sharks) attacking the men of the Persian fleet, shipwrecked off Mount Athos, on the coast of Thessaly, in 492 B.C. Professor Woodhouse, to whom I referred for further information concerning this passage, writes that:

> D'Arcy Thompson says that the Greeks were familiar with many species of shark, dogfish, skate, and that Aristotle's knowledge of these was peculiarly detailed. He mentions as known the smooth shark (*Mustelus lævis*), the spiny dogfish (*Acanthias vulgaris*), the fox or thresher shark, and perhaps the great blue shark, the dangerous stingray (*Trygon pastinaca*), the torpedo ray . . . That dangerous sharks were known to the Athenians is proved by the story of the boy who was seized by one when he went into the water with his pig in connexion with the ἅλαδε μύσται ceremony.

Pliny,[19] in his "Natural History", refers to the vast numbers of sharks (*"canicula"* or *"canis marinus"*) which infested the seas in the vicinity of the sponges, to the great peril of those that dived for them. The divers, using a stiletto, had terrible combats with the sharks, which attacked with

avidity the groin, the heels and the whiter parts of the body.

The origin of the name "shark" is not definitely known. It appears to have been introduced into England by the sailors of Captain (afterwards Sir John) Hawkins's expedition, who brought home a specimen, which was exhibited in London in 1569. Previous to this they were referred to as "tiburon". Murray's English Dictionary gives under "tiburon" a reference to Eden, Decades, 1555, page 201. "The Tiburon . . . is a very great fysshe and very quicke and swifte in the water, and a cruell devourer." In an account by Antonio Pigafetta[20] of the first voyage around the world (1519-1522), in his description of Sierra Leone, he writes:

> During the calm there came large fishes near the ships, which they called Tiburoni (sharks), which have teeth of a terrible kind and eat people when they find them in the sea either alive or dead.

A description of an actual attack is contained in a letter by an eye-witness from Cochin, in India, dated January 10, 1580,[21] in which it is written:

> I have seen many kinds of fish . . . What called forth still greater surprise on my part were other big fishes, that are in the ocean and that eat man alive, whereof I have been myself a witness. For when a man fell from our ship into the sea during a strong wind, so that we could not wait for him or come to his rescue in any other fashion, we threw out to him on a rope a wooden block, especially prepared for that purpose, and this he finally managed to grasp and thought he could save himself thereby. But when our crew drew this block with the man toward the ship and had him within half the carrying distance of a musket shot, there appeared from below the surface of the sea a large monster called Tiburon (a Spanish word meaning shark), it rushed on the man and tore him to pieces before our very eyes. That surely was a grievous death.

Pennant,[22] in 1776, describing the white shark, wrote:

> This grows to a very great bulk, Gillius says, to the weight of four thousand pounds; and that in the belly of one was found a human corpse entire, which is far from incredible, considering their vast greediness after human flesh. They are the dread of the sailors in all hot climates, where they constantly attend the ships in expectation of what may drop overboard; a man that has that misfortune perishes without redemption; they have been seen to dart at him like gudgeons to a worm. A master of a Guinea ship informed me that a rage of suicide prevailed among his new bought slaves, from a notion the unhappy creatures had, that after death they should be restored again to their families, friends and country. To convince them at least that they should not reanimate their bodies, he ordered one of their corpses to be tied by the heels to a rope and lowered into the sea, and though it was drawn up again as fast as the united force of the crew could be exerted, yet in that short space the sharks had devoured every part but the feet, which was secured at the end of the cord.
>
> Swimmers very often perish by them; sometimes they lost an arm or leg, and sometimes were bit quite asunder, serving but for two morsels for this ravenous animal: a melancholy tale of this kind is related in a West India ballad, preserved in Doctor Percy's Reliques of ancient English Poetry (Vol. I, 331) . . . The mouth is placed far beneath, for which reason these, as well as the rest of their kind, are said to be obliged to turn on their backs to seize their prey, which is an observation as antient as the days of Pliny (*Omnia autem carnivora sunt talia et supina vescantur*. Lib. IX c. 24). The eyes are large; the back broad, flat and shorter than other sharks. The tail is of a semilunar form, but the upper part is longer than the lower. It has vast strength in the tail, and can strike with great force, so that the sailors cut it off with an axe as soon as they draw one on board . . . The antients were acquainted with this fish; and Oppian gives a long and interesting account of its capture.

The earliest attack known in Australian waters is described in the *Sydney Gazette* of January 31, 1837, as occurring on a boy, aged twelve, in the Macleay River, who died of tetanus following the injury.[16] That sharks were feared in Sydney much earlier than this is evidenced by "A Caution to Parents" appearing in the *Sydney Gazette*, 1806,[23] wherein people were warned that a shark was hovering round Hospital Wharf. The first known attack in Sydney Harbour occurred in 1842. In the account of the voyage of the *Rattlesnake*[30] in 1847, describing Moreton Bay, Queensland, it is stated:

> Sharks are numerous close to the beach but are generally small and harmless; one of the natives, however, had lost his foot at the ankle joint from the bite of one.

A tombstone in Victoria (Melbourne *Herald*, December 30, 1929) records the death of a man who was taken by a shark on February 6, 1876.

The Evidence of the Responsibility of the Shark.

For the reason perhaps that these attacks occur only in the tropical and subtropical zones, sharks are regarded as harmless in certain parts of the world. This view is still widely held. In 1902 Guthrie[6] described several cases and stated that a "certain gentleman" had "published the reward of one thousand dollars for the production of an authentic case of shark-bite". Definite evidence that sharks will attack man, apart from the evidence of eye-witnesses, is provided by the following:

1. On June 17, 1925, a shark seven feet long was caught in Prince's Royal Harbour, Western Australia, and found to contain a human arm in its stomach.

2. On January 6, 1912, a man was attacked by a shark in Sydney and bitten on the side of the thigh, the penis and scrotum also being bitten off. An attempt was made to catch the shark and forty-eight hours later a shark was caught and identified as a whaler (*Carcharhinus macrurus*). About two inches from its vent were found the penis, scrotum and adjacent tissues of the victim almost unchanged.[11]

3. Figure I illustrates a shark which bit a man, the details being given below. In this the evidence is beyond any doubt. The shark has been identified as a whaler (*Carcharhinus macrurus*).

It is further of interest to note that there is reason to believe that sharks were used for human sacrifice by the natives of Hawaii early in the nineteenth century.[28]

The present paper records all attacks on bathers, horses, men in boats and fishermen, attributed to sharks since 1919. Although strict proof is lacking of the responsibility of the shark for many of these attacks, it is thought that there can be but little doubt in the matter and that the only likely source of error is attacks by crocodiles in the northern Queensland waters north of the Fitzroy River. The

recognition of the larger sharks as sharks, apart from their species, is an easy matter if the characteristic appearance of the dorsal fin above the water is seen. This is so well known to Australian bathers that any report of a shark having been seen is likely to be correct, and on most of the larger surfing beaches shark look-outs are stationed to warn the bathers by a special bell. In some of the instances here recorded sharks were seen in the process of attacking their victims. In others sharks were seen in the vicinity either shortly before or directly after the attack, and attempts were often made to catch them. In all, the attacks were attributed to sharks by the victims or onlookers, and this has usually been borne out by the resemblance of the wounds to those of known shark bites.

Figure I.

A whaler shark (*Carcharhinus macrurus*) which attacked a man at Bribie Passage, Queensland. (For details see text.)

Consideration of the other large fishes known to cause somewhat similar wounds—the swordfish, the sawfish and the long-nosed sea pike (*Sphyræna barracuda*)—two of which are occasionally found off the Australian coast, leads one to believe that they have not been responsible for any of the attacks here recorded. Swordfish attack by transfixing the victim's body. In a reported case,[24] which occurred at Sierra Leone, a man, whilst sitting on the gunwale of a boat, had his body transfixed from the back by the blade of the sword, which broke off in his body and was later successfully removed. Sawfish[34] are armed with long snouts fitted with long and sharp spikes. The only reference to an attack, that can be traced, is a statement in Day's "Fishes of India" that:

Great injuries are inflicted by these fishes, which strike sideways with their formidable snouts; although not personally a witness of the fact, I have been informed on native authority that large ones have been known to cut a bather entirely in two.

The long-nosed sea pike (*Sphyræna barracuda*), not to be confused with the common Australian "barracouta" (*Thyrsitis atun*), is reported to have attacked a man swimming in the Caribbean Sea, near Colon.[26] The authors, E. W. Gudger and C. M. Breder, well known American ichthyologists, attribute the wounds to the *Sphyræna barracuda* rather than a shark, from a consideration of the wounds received. This species does not occur in Australia. The Australian varieties of sea pike (*Sphyræna obtusa* and other forms of *Sphyræna*) are smaller and harmless to bathers.

Attacks on Horses.

During the period under review two attacks on horses are recorded, one at Orange, South Australia, in April, 1926, where a racehorse managed to evade an attack by a shark twelve feet long, the other at Eden, New South Wales, in October, 1927, when a horse and man were attacked in the Kiah River.

The horse bucked and reared and evaded the shark, but in doing so broke the girth. The man fell into the water and had to swim 100 yards to the shore. The shark, apparently frightened, made no further attack. It was thought to be one of a number that in the whaling season haunt the river entrance in the vicinity of the Kiah boiling down station.

Attacks on Men in Boats.

Sharks are known to attack boats and canoes and to tear oars away from the hands of the rowers and to have capsized native canoes, especially at night time. Townsend[8] relates the following story.

A tragedy of the Ellice Islands was related to us at widely separated points in Polynesia. About forty natives, crossing in canoes at night between islands several miles apart, were caught in a squall. One of the canoes was swamped and the occupants were seized by sharks which had been following the fleet of boats and nipping the paddles. In a few minutes great numbers of maddened sharks were seizing paddles and outriggers, until all the canoes but one had been swamped and their occupants devoured. Two natives only escaped to describe the disaster.

In the following incidents it is thought that most of the attacks are due to the blue pointer (*Isuropsis mako*).

1. At Darwin on November 30, 1919, a shark attacked a man sitting in a boat. No further details are known.

2. A rowing skiff, in which four miners were fishing off the Bellambi Reef, New South Wales, was attacked by sharks on June 16, 1923. The sea was calm, a disturbance was seen in the water and those in the boat noticed a school of sharks making towards them. They immediately made haste to get out of the way, when one of the sharks darted beneath the boat and tore a hole in it and threw the four men into the water. They rose to the surface and clung to the sides of the boat. After half an hour one of the men, who was a good swimmer, volunteered to swim ashore for assistance, a distance of about two miles. He had gone about twenty yards when his companions heard him give a cry and saw him disappear. Another man also tried to swim ashore, but owing to the lines becoming entangled in his legs, he gave up. The other two men became exhausted and sank, leaving him alone. He was rescued by the passing *Kurrara*, which was unable, in spite of a search, to find any trace of the other men. The locality is said to be infested with sharks at this time of the year.

3. Two young men, fishing in a fourteen-foot boat off Bellambi Reef, New South Wales, on July 3, 1927, felt a bump on the bottom of the boat and saw the form of a shark disappearing. They pulled in their lines and rowed a quarter of a mile nearer shore. They again felt an alarming blow on the bottom of the boat, so severe that

the bow was lifted two feet out of the water, throwing a sheet of spray high into the air. The shark was again seen.

4. Near Glenelg jetty, South Australia, on February 9, 1929, a shark attacked a canoe and propelled it for about one hundred yards. One of the occupants tried to push it off with a paddle, which broke. The shark, attacking fiercely, prevented him from turning the canoe towards the shore. A passing yacht came to their rescue.

5. On December 2, 1930, at Rosebud, Victoria, a man, returning from fishing in a twelve-foot dinghy, was attacked by a large shark, which seized the gunwale and almost overturned the boat. The man had great difficulty in preventing himself from falling overboard. Even when the boat entered shallower water, the shark followed. Seven shark's teeth were found later embedded in the woodwork of the boat.

Attacks on Fishermen.

A number of attacks have occurred whilst fishing nets were being drawn in.

1. At Taree, New South Wales, off Black Head, on October 17, 1923, a very large shark attacked a fifteen-foot boat, from which two fishermen were hauling in a net. The shark first attempted to eat the fish in the net whilst it was being hauled in, but later attacked the boat, springing several planks and biting some pieces out of the gunwale. The men were rescued by a passing launch.

2. At Bribie Passage, about two miles from Caloundra, at the mouth of the Brisbane River, Queensland, on April 11, 1929, a young man, aged twenty years, was standing up to his knees in about two feet of water, helping some fishermen pull in a net. A shark (Figure I), about five feet in length, caught in the net, snapped at him, seizing him by the right leg, biting off almost the whole of the calf. It did not swallow the flesh, which was seen floating about afterwards. On the arrival of the ambulance men, he was suffering severely from shock and loss of blood. He was taken to Maleny Hospital, where soon afterwards an operation was performed. After the hæmorrhage had been controlled, his condition became so low that he was rushed back to bed. He made good progress and was discharged thirteen days later to the out-patient department with only a small area of skin unhealed. He was readmitted three months later on account of a small area of the wound continually breaking down. Later, two extensive plastic operations were performed at Brisbane Hospital with a very satisfactory result.[1]

3. At Encounter Bay, South Australia, on March 6, 1931, a young fisherman was hauling in a net when he discovered that it contained a "cocktail" shark, about six feet long. He had pulled it into the boat and was disentangling the net when the shark snapped at his hand and gripped it. The man gouged out the eyes of the shark with his other hand and it then released its hold. The "second finger of his right hand was badly bitten and two others lacerated". Owing to weakness and loss of blood he was unable to control the boat, which drifted until he was rescued by another fisherman.

Men Disappeared Believed to Have Been Taken by Sharks.

In a number of instances men have disappeared and are believed to have been taken by sharks. The evidence, however, is somewhat indefinite. There is a view, which will be discussed later, that a shark will not attack the dead body of a man, so that when the body of a man has been washed ashore and shown evidence of shark attack, it has been assumed that the attack took place before death. This assumption, it will be seen, is not always justified.

[1] I am indebted to Matron G. B. Irvine and Mr. J. A. Galloway, the Acting Secretary of the Maleny Hospital, for the details of the attack and for the photograph.

1. On January 8, 1922, at Stockton Beach, Newcastle, New South Wales, a young man, aged twenty-six years, disappeared one evening whilst surfing one hundred yards from the shore. His skeleton was later cast up with the head missing. "From the manner in which the ribs were broken" it was thought that he had been taken by a shark.

2. On October 20, 1922, a man was sailing in Botany Bay, Sydney, and did not return. On November 9 his body was found with the front walls of the chest and abdomen missing. This was thought to be due to sharks, which were plentiful at the time.[100]

3. At Condon, Western Australia, on November 23, 1923, two Koepang islanders, who were dry shelling, disappeared, and it was thought that they had been taken by sharks. Half the body of one was found, but no trace of the other man.

4. At Urunga, Bellinger Heads, New South Wales, on November 2, 1923, a man, whilst fishing, was standing up to his waist in water and felt a strong pull on his line. When about to haul it in, either a shark or the undertow seized him and he disappeared. His wife, who was a witness of the accident, thought that he was taken by a shark.

5. At Kiama, New South Wales, on April 25, 1924, a man met his death in circumstances which suggested that he was taken by a shark. He was fishing near the blow-hole when he fell into the water. A companion threw him a line, but he, apparently in no danger of drowning, turned to swim to an easier landing place. His companion walked to this spot, but although less than a minute had elapsed, there was no sign of him. He was swimming so strongly and confidently a moment before that it is thought that he must have been attacked by a shark. Some of his remains found later supported this view.

Other Shark Incidents.

Other incidents are reported since 1919.

1. Two people pulled a man from the water on April 30, 1924, at Fremantle, Western Australia, who told a somewhat remarkable story.

He said he went for a swim and, being a strong swimmer, was soon half a mile from land. On turning to swim in, he noticed a large shark in front of him and only a few feet away. Immediately he commenced to "battle for his life". For three-quarters of an hour he indulged in all manner of water antics and was forced to swim in circles at times in order to avoid the shark, which did not attack him, but followed him closely and turned when he turned. Eventually, "swimming in spirals", he reached the beach. He received no injuries apart from some abrasions from being pulled up on the shore, and was treated in hospital for shock and immersion.

2. In the following incident it was probably the shark more than the man that was frightened.

A man, aged forty-nine years, went swimming on Christmas afternoon, 1930, in Powell's Creek, an inlet of Homebush Bay, Parramatta River, New South Wales. He had entered the water and was about fifteen yards from his friends, in about eight feet of water, when he saw the fin of a shark approaching. The shark brushed past his leg, causing an abrasion. He immediately called out "shark", and in the scramble of bathers to leave the water, the muddy bottom of the canal was churned up, almost blinding the shark, which appeared to become maddened by the confusion. The shark escaped down the channel and the man struggled ashore, suffering mainly from the shock of the encounter. Dr. Templeman, of Homebush, has kindly supplied the following information:

> He was with a party, but left them to swim a canal to bring a child across on his back. He felt a bump on his right hip and thought that he had struck a log. A few seconds later he felt the bump again, this time stronger, and decided that it must be a shark. He then commenced to splash and create a disturbance and in a moment was again attacked, this time on the right leg, half way between the knee and the ankle. He was again struck on the hip while he was

endeavouring to make back for the bank he had left. His only visible lesions are abrasions on the outer aspect of the middle third of his right leg, though he complains of his hip being stiff.

That this man was fortunate in not suffering more severe injury is shown by the analogy of the following, which illustrates the strength of a shark.

3. When the *Tahiti* was at Rarotonga in 1926, a native threw out a line to a large shark which was swimming round the ship. It was hooked and brought to the side of the boat. A slipknot was tied round its tail and it was hoisted aboard. As the boatswain tried to undo the knot the shark lashed out with its tail, striking him on the head and causing deep and ugly gashes, which required attention from the ship's surgeon.

These two incidents illustrate a type of injury which probably occurs in many instances, in addition to or apart from a bite—wounds and abrasions from the impact of the shark's body or fins.

Attacks on Bathers.

In the following incidents severe injuries have been inflicted on bathers, it is believed, by sharks.

Queensland.

Q.1. At Ross Creek, Townsville, on January 7, 1919, a man was shrimping and went for a swim. Whilst wading in deep water he was attacked by a shark. The bite amputated his leg at the thigh. Beyond the fact that he was admitted to hospital no further information can be obtained.

Q.2. At Townsville, Queensland, on March 8, 1920, a man was in a sailing boat with six other men when they were struck by a squall in Cleveland Bay, near Bay Rock, ten miles from Townsville. The boat capsized and he, with two other men, set out to swim for the shore. After he had been half an hour in the water a shark attacked him. He was thrown out of the water by the impact, but fell back free. He struck out again, and after some hours reached the rock safely, but exhausted. Dr. Harold Miller[6] describes his injuries as follows:

> The wounds were not deep. The majority only penetrated the skin and subcutaneous tissues. Those on the buttock extended more deeply and the muscles were exposed. Some of the wounds on the posterior aspect of the thorax also penetrated as far as the ribs.

The photographs accompanying Dr. Miller's article show the marks of the teeth arranged in order of the upper and lower jaws, one row on the abdomen, the other opposite it on the right loin.

Q.3. In the Bulimba Reach of the Brisbane River, on November 27, 1921, a man was wading out to a dinghy moored about ten yards from the bank, carrying his son, aged eight, on his back. Just before he reached the boat a large shark seized his right hip. He succeeded in beating the shark off, but before he could reach the shore it again attacked, biting his right elbow and forearm and severely lacerating his right wrist. An onlooker on the shore, seeing the fin of the shark, rushed to the injured man's assistance and after a struggle managed to bring him to the bank. The son either fell off the father's back or was pulled off by the shark. The boy's head appeared about five yards away, but only for an instant, and his body was never recovered. The attack took place in three feet of water. The man was immediately taken by a passing police launch to the Brisbane General Hospital, suffering severely from shock. Dr. Alex. Murphy has kindly supplied the following information.

He was admitted to hospital on November 27, 1921, having been bitten by a shark. There was a skin wound 12·5 centimetres (five inches) long on the right buttock and there was a severely lacerated wound at the back of the right elbow; the nerves were not severed; the radio-ulnar joint was opened. On November 28, 1921, the buttock was sutured and the lacerated arm was cleaned, drainage tubes were inserted and the wound was sutured with silkworm gut. His temperature was 39·4° C. (103° F.) on the following day; it gradually fell, but rose again until December 6, 1921, when a further operation was performed and three drainage tubes were inserted in the region of the elbow. The temperature was normal by December 10, 1921, and the patient was discharged from hospital on February 21, 1922. He died on June 8, 1932, as the result of a street accident.

Q.4. At Pialba Beach, between Scarness and Torquay, Maryborough, on December 5, 1922, a young man, aged nineteen years, was bathing with three friends during a very high tide in about three or four feet of water, when he was attacked from the shore side by a shark, which appeared to be about nine feet in length. A friend went to his assistance and rescued him. The right side of his chest wall was badly torn and below that a complete bite extending from the lower ribs, including the tissues of the right hip, had been taken out, the teeth having apparently slipped down from the chest wall in the struggle. He died about one minute after rescue.

The shark continued to swim round and was easily seen from the shore. It was described as a "blue shark". Several lines were put out and some shots were fired at it, but without effect. Prior to the attack, there were a lot of mullet in the water and a large shark had been seen in the vicinity. This is the first attack known to have occurred on this beach for forty years.[1]

Q.5. At Ross Creek, Townsville, on January 15, 1922, a man was attacked by a shark whilst swimming along the bank of the canal. He was accompanied by several others, and was the second to enter the water. He lost his life and it is stated that a fight for his body took place in the blood-stained water.

Q.6. At Alma Bay, near Magnetic Island, Townsville, on January 27, 1929, a young man, aged eighteen years, was swimming at about 5.30 p.m. The tide was low, and there were about forty people bathing at the time, and at least six bathers were beyond him. Suddenly he was seen to be struggling violently. A shark had seized him by the left arm, which it took off above the elbow. It attacked again, inflicting a large gash on his right buttock. In a third attack, his right forearm was taken off. He walked ashore and a nurse who was present rendered first aid. He was taken by launch to Townsville, where he was admitted to hospital. He was conscious throughout. At hospital, he was operated on and both arms were amputated, one above, the other below the elbow. He became unconscious at 10 p.m., and died at midnight.

Q.7. At Ross Creek, Townsville, on September 1, 1929, a man fell into the water from a wharf. He had hardly struck the water when a shark attacked him, tearing the flesh off both legs. He was rescued, but died shortly after he had been lifted into the boat.

Q.8. On January 9, 1931, a boy, aged eighteen, was attacked by a shark in the sea at Yeppoon, near Rockhampton. He went for a swim and, as it was low tide, decided to venture into deeper water. When about six hundred yards from the shore he felt a bump, and looking round he found that a young shark about five feet long was attacking him. The shark made toward him a second time and caught him about the middle of the body. He managed to beat it off, but it came again, this time catching him lower down. It relaxed its hold and dived under him, throwing him completely out of the water and then disappeared. The boy's brother, who was swimming a hundred yards away, saw him thrown out of the water and swam over to him. Both then made for the shore. He walked to hospital, when it was found that his costume was torn to shreds and a number of teeth marks were visible.

Dr. Beaman has very kindly supplied the following information. The statement of the boy was: "I was swimming outside the breakers and felt a bump against my

[1] I am indebted to Dr. W. G. Brown, Medical Superintendent, General Hospital, Maryborough, for details of the attack.

body, and the next moment a shark bite on my right side, and I caught a glimpse of the shark as he swam away."

Dr. Beaman writes:

> The boy came ashore at once and was at the hospital within a few minutes, where I saw him. The bite was that of a large fish on the flank. Teeth marks almost symmetrical, fore and aft. They had not the character of a shark's bite. The boy was not much distressed, and after dressing the wound he went home. It was a month before the wounds were completely healed.

Although it has been suggested that this attack has been due to a gigantic pike, there is every reason to believe that it was due to a mako shark. The wounds are similar to those received in Case Q.2, pictured by Miller,[9] and are unlike the wounds usually attributed to the pike.

Q.9. At Ross Creek, Townsville, on March 22, 1931, a young Japanese, aged nineteen years, was trying to catch shrimps and herrings with a cast net, when the mesh became entangled in a snag. He waded out to the net and when in about three feet six of water he was attacked by a large shark, which seized his left thigh, tearing away a large portion. He died soon afterwards.

Q.10. On the Great Barrier Reef near Innisfail, on November 27, 1931, two aboriginal fishermen, who were in the water, were attacked by a shark. One of them escaped, but the shark caught the other by the left foot. The shark did not close its jaws and the aboriginal managed to withdraw his foot, which was badly lacerated. He was then taken to hospital. Dr. James Ginane has kindly supplied the following information.

> A.M., an aboriginal diver, aged forty-five years, was admitted on the morning of November 26, 1931. He had been diving for pearls from a lugger and had been bitten on the left foot by a thirteen foot shark, when two fathoms down. He shook himself free. On examination, he was suffering from shock and loss of blood. (1) Lacerated wound starting on inner posterior angle of sole of left foot, emerging inwards and forwards to end on medial part of dorsum of foot just in front of the end part of foot. Part of calcaneus had been severed from the main part of the bone, and was lying in posterior edge of wound. No severed tendons or vessels of any size in this wound. (2) On dorsum of left foot was a V-shaped lacerated wound with some skin gone. Tendon of fourth toe was severed and there were a few spurting vessels. The wounds were sutured, but on the dorsum there was a bare area due to the deficiency of skin. No attempt was made to suture the tendon of the fourth toe. On December 1, 1931, the wound was dirty and eusol baths two hourly were started. The wound cleaned up and by December 13 was healing nicely. On the night of December 13 Albert absconded, leaving even his clothes and tobacco behind. We have not seen him since.

Q.11. At Kissing Point, Townsville, on January 4, 1933, a man and a boy went for a swim off the beach. The boy was sitting in three feet of water, when he saw the grey form of a shark shoot through the water. He hastily ran ashore, calling to the man to hurry out. On reaching the shore he saw the man struggling on his knees and the water reddened with blood. The shark swam away and the boy rushed to the man, who was dead and frightfully mutilated about the body. A shark was known to have been in the vicinity. Fourteen days previously, a man leaving the water with his dog, at about the same spot, on reaching the water's edge, heard a scuffle behind him and turned round to see his dog bitten in two by a large shark.

Q.12. On a reef near Barrow Point, 100 miles north of Cooktown, on February 15, 1933, a native diver was attacked by a shark. He was diving from a dinghy for trochus shell with two other natives. When coming up and about two fathoms below the surface, a shark, said to be fourteen feet long, seized him by the arm. One of the natives in the dinghy threw a spear at the shark, which released its hold, but made another attack, which the diver attempted to ward off with his arm. On being pulled into the boat, he was bleeding freely from the shoulder and arm. After a trip of two days he was admitted to the Cooktown Hospital. No further details are known.

Victoria.

V.1. At Town Pier, Port Melbourne, in October, 1924, a man is reported to have had his leg mauled. Another man drove the shark off with a penknife. No further details are obtainable. (Melbourne *Herald*, January 7, 1926.)

V.2. At North Brighton, Melbourne, on February 16, 1930, a young man went for a swim off the pier. He was attacked by a shark, sixteen feet long, and dragged under water. The shark was seen later, holding him by one leg, the boy being across its nose, punching it with both hands. He again disappeared and came up again, still beating it with his hands, but his strength was obviously failing. The shark let him go and then, with fin and tail out of the water, it made another rush at him, the impact almost lifting the boy out of the water as the shark seized him round the chest with its jaws. This was the last seen of him.

Sharks had been previously in the vicinity and bathers were warned. This is the first fatal attack which is known to have occurred in Victoria for over fifty years.

South Australia.

S.1. At Adelaide, about 4 p.m. on February 18, 1926, a well known swimming instructress and a noted life-saver, prior to giving swimming lessons to a number of children who were assembled on the pier, went for a swim. Soon afterwards she was heard to scream and disappeared. Two men in a boat rescued her. She displayed great courage and was conscious on rescue. Her right thigh was practically bitten away and she was badly torn about the body. She died in the boat within four minutes after the attack. An eye-witness described the shark as being about twelve feet long and of the "shovel-nosed" type or "ground" species; others described it as a "seven-gilled" shark. It swam about until sunset. Efforts to catch it were unsuccessful.

Western Australia.

W.1. At Claremont, Swan River, on January 27, 1923, a boy, aged thirteen years, was bathing at the Scot's College, about five miles from the mouth of the river, with several others in a picnic party. He was by himself about twenty yards from the shore, in about twenty-five feet of water, when he suddenly called out "something has bitten me", and swam ashore. He was helped out, bleeding profusely from extensive wounds on the back of one thigh. Though a doctor was quickly on the scene and the boy was hastened to hospital, he died two hours later from hæmorrhage and shock. This tragedy broke a long immunity from shark attacks in Western Australia.

W.2. At Cottesloe Beach, Fremantle, on November 22, 1925, a man, aged fifty-five years, was bathing when a large shark swam in amongst a crowd of bathers, attacked and killed him. For hours afterwards the shark swam along the beach. Efforts to catch it were unsuccessful. Three swimmers who made an heroic attempt to rescue the injured man, narrowly escaped being bitten. The shark believed to have made the attack was caught and examined. Nothing was found in its stomach, but this was attributed to digestion. That it was a tiger shark appears to have been claimed on good authority, but there was some difference of opinion at the time concerning its identity.

New South Wales.

A. Sydney Harbour.

N.1. At Sirius Cove, on January 10, 1919, at 7.30 a.m., a boy went for a swim and had waded a short distance

when he was attacked by a shark, which dragged him under. The shark disappeared and the boy rose to the surface. He was later rescued by a boat. There was a wound a foot long on the right thigh, exposing the bone and severing the femoral artery, and abrasions were present on the medial side of the left thigh. He was attended by Dr. Doak, but died shortly after being brought ashore. Dr. Doak describes the wound as having an appearance as if it had been made by a spokeshave.

N.2. In the Parramatta River, on January 19, 1924, a boy, aged sixteen years, and a number of other boys went for a swim about 4 p.m., close to the asbestos works near Camellia. He was first to enter the water. When in about three feet of water he was savagely attacked by a shark and so severely injured that he died within three minutes. He cried out for help and was seen to be fighting vigorously to free himself. Another boy went to his assistance and dragged him ashore. It was reported that the flesh of his right thigh was torn to the bone from the hip to the knee, and that there was a deep lacerated wound on his left arm. The shark was described as a grey nurse, ten feet long.

N.3. In the Parramatta River on December 26, 1929, a boy, aged sixteen years, went for a swim in White Bay, near Bald Rock Jetty. He dived in and rose to the surface shouting "shark". The water was tinged with blood. Onlookers saw a long grey shark attack him again and again. It then cruised around him until a motor boat arrived. The shark is said to have swum round and round, snapping at the boy every few seconds. When he was lifted on board the launch it was found that his left arm was amputated above the elbow and there were lacerations on his chest. The thumb of his right hand was missing and there were abrasions where the rough hide of the shark had brushed past him, and a jagged wound of the left thigh, extending down to the bone.

The attack occurred about twenty yards from the wharf. The ambulance was soon on the spot, but the boy died soon after being rescued. The water temperature at this site was about 21·1° C. (70° F.) on the day of the attack.[29]

B. Sydney Beaches.

N.4. At Coogee, at about 3.30 p.m. on February 6, 1922, a young man was attacked by a shark. The "shoots" were good, and he was bathing on the reef thirty to forty yards from the clubhouse. He saw the shark and immediately shouted a warning to the other surfers. Whilst he was swimming ashore the shark attacked him with great violence. Both his arms were badly injured. He reached shore and was immediately taken to Sydney Hospital by ambulance. The hospital records show that he was quite unconscious on admission, his colour being very pallid, respiration slow, pulse just palpable, and reflexes absent.

There was a semilunar wound on each side of the right arm, in the region of the elbow, seven inches long. On the left arm a large lacerated wound in the shoulder region had severed everything except the humerus. There were several small punctured wounds round the left elbow.

He died on admission at 3.55 p.m. Death is stated to have resulted from collapse due to loss of blood.

N.5. At Coogee on March 3, 1922, towards 11 a.m., some thirty people were surfing. There was a half-tide. A sandbank running out from an inshore channel furnished a footing for surfers about twenty-five yards from the beach. The foremost of these was a young man, aged twenty-two years. The surf was about knee-deep. The fin of a shark was seen from the shore by the beach inspector making towards the surfers. He immediately gave the shark warning and all made a frantic rush to leave the water, except the young man who, seeing the shark's onslaught, turned to meet it. He punched several times with his right arm at the shark, which took it off, leaving a bleeding stump. He tried to take a small "shoot" in, but again the shark attacked. In the attempt to ward it off he injured his left arm. The two attacks took place within a few seconds. Two men went to his rescue and while they were dragging him in the shark made a third attack. The shock of the impact shook the rescuers. He was conscious on being brought ashore, where he immediately received expert first aid attention. He was then sent to Saint Vincent's Hospital by ambulance.

The hospital records describe his injuries as follows: (i) right hand torn off; (ii) left hand *minus* little finger and terminal phalanges of the third and fourth fingers; (iii) circular laceration passed from anterior aspect of anus around and through *gluteus maximus* muscle and up as far as promontory of the sacrum passing through the deep spinal muscles of back; (iv) three or four "teeth" marks down back of left thigh, laceration very ragged. The patient extremely shocked and bloodless on admission.

Dr. O'Gorman Hughes operated. Wounds of the buttock were partly closed, the left hand was reconstructed and the right hand amputated. Before midnight gas gangrene due to *Bacillus aerogenes capsulatus* and the *Bacillus welchii* had commenced and soon there was a characteristic odour about the bed. By the following night the gangrene had spread a great deal and although the patient was operated on again, it did not in any way check the progress of the gangrene and he passed away quietly at 5 p.m. on March 4, 1922, suddenly, due to toxic absorption and septicæmia.

The beach inspector, who saw the shark, described it as a blue pointer about eight feet long.

N.6. At Bronte, on February 13, 1924, a woman, aged thirty years, was attacked by a shark at about 7 p.m. She was one of a party of five bathing close to the shore in about five or six feet of water. She was heard to give a piercing scream, and immediately several bathers rushed to her rescue. One of her rescuers, a police constable, stated that he felt the shark pull at her legs when he attempted to drag her out. An eye witness stated that she was only three or four feet from the shore when she screamed and appeared to be dragged in for several yards. She was then taken to Saint Vincent's Hospital by ambulance, in a critical condition.

The hospital records show that her right leg was completely severed about the middle third. Her left foot was almost taken off at the ankle joint, the tissues being badly lacerated and the bones exposed. The left tibia showed vertical scrapes in the bone, evidently made by the teeth.

At 10.20 p.m. she was operated on by Sir John McKelvey. The right leg was amputated just above the condyles of the femur, and the left leg was amputated in the lower third. The patient recovered and was discharged on March 10, 1924.

N.7. At Coogee on March 27, 1925, a boy, aged sixteen years, was bathing at 5.30 p.m. in foam-spattered surf and in shallow water about twenty to thirty yards from the shore. He was up to about his waist in the water when he was attacked by a shark. Onlookers who saw the shark stated that it was small. The shark bell was rung before the attack took place. It is said that the shark leapt from the water and turned over to bite him, first above the knee and then below, but was unable to drag him into deep water, lashing the sea furiously in an attempt to do so. The young man broke away and staggered to the shore; the shark in the meantime swam off. He was taken by ambulance to Saint Vincent's Hospital. The following notes are taken from the hospital records.

The patient was admitted about 6 p.m. on March 27, 1925, with a history of shark bite on the left leg. He was very shocked, pale and sweating; he was conscious and in great pain. On examination the left leg had a tourniquet above the injuries, which consisted of a deep gash down to the bone in the middle third of the left thigh laterally and numerous jagged gashes down the leg. The tibia was exposed above the ankle. The middle third of the lower leg was bandaged and left so until operation. The temperature was subnormal.

Operation was performed at 9 p.m. by Dr. Edye. Blood transfusion of 700 cubic centimetres was given at 11 p.m. The patient's condition picked up considerably after this. At operation a deep gash down to the bone was found

on the lateral side of the left thigh and below that there were many severe lacerations down to the ankle. The fibula was fractured, the tibia indented and the knee joint widely opened. All the wounds were full of sand. Amputation was performed at the junction of the upper two-fifths and lower three-fifths of the thigh; the wounds healed well and the patient was discharged on May 4, 1925.

The wounds in this case are of considerable interest and are somewhat like those described by Gudger and Breder,[26] being two deep incised wounds, one above, the other below the knee. It is difficult to understand from the configuration of a shark's jaws how deep and almost straight incised wounds could be caused by their bite. The patient himself definitely stated that he was attacked twice.

N.8. At Bondi, on April 14, 1928, a boy, aged nineteen years, was swimming at about 4 p.m. waiting for "shoots" with a number of other swimmers about a hundred yards from the shore. They all "got the wave" except this boy, who was treading water alone when he was attacked and dragged several yards under water. Although the flesh was stripped from knee to ankle on one leg, he swam nearly a hundred yards unaided.

In an interview given to *The Sydney Morning Herald* he stated: "I felt like a sharp stab of pain in my leg as the shark got me in its jaws. Then I went under and tried to beat it off with my fist. I punched it several times, where, I don't know. I think it was on the jaw, but it had me in a vice-like grip. Finally, I succeeded and in a flash I was free. My leg was not hurting me much; it seemed numb."

On reaching shore, he was quickly taken to the club house, where a tourniquet was applied. He was taken by ambulance to Saint Vincent's Hospital. The hospital records give the following description of his injuries and his progress.

He was admitted on April 14, 1928. The whole of the left leg from just below the knee to the ankle was stripped of soft tissues. The fibula was missing and the tibia was eaten away to some extent. A ligature was present above the knee (tourniquet); the patient was conscious. He was very shocked on admission, pulseless and cyanosed. At 4 p.m. treatment of shock was carried out. His general condition was critical at 5 p.m. His condition then improved slightly and he was taken to the theatre at 7 p.m. with his general condition greatly improved. His pulse was now palpable, its rate being 120. Operation started at 7.55 p.m. and lasted until 9.15 p.m. Blood transfusion was given; his general condition improved to such an extent that Dr. Edye decided to amputate. Amputation was performed three inches above the knee, with anterior and posterior flaps. Bleeding points were secured and the main arteries were ligated. The flaps were sutured and two tubes were inserted. The patient was returned to the ward in fair condition. On April 15, 1928, he was remarkably well; his pulse rate was 100; he was not complaining of pain. The wound healed without signs of infection. He was discharged on May 14, 1928, to the out-patient department.

N.9. At Bondi, on January 12, 1929, a boy, who was a good swimmer, was about a hundred yards out and up to his waist in water. It was late in the afternoon and there were about a hundred people bathing. Sharks had been sighted previously during the day. He was on the edge of the crowd when he was attacked. The beach inspector said that he was only in about four feet of water at the time and that many of the bathers were much further out. An eye-witness saw him struggling with the shark, which was lashing the water and dragging at him. The boy was attempting to push the shark away. The shark made a second attack and pulled him nearly under water. A rescuer then reached him and brought him ashore. He was immediately taken to the surf club and then to Saint Vincent's Hospital.

The details from the Saint Vincent's Hospital records are as follows. He was admitted on January 13, 1929, and died the same day. A large lacerated wound on the right thigh extended from the iliac crest to about the middle of the right thigh. The crest of the ilium was partly torn off and lying in varying fragments. The wounds were about fifteen inches long by nine inches wide. The patient was severely shocked, his pulse rate was 104, his temperature was not registrable.

N.10. At Collaroy, on January 16, 1929, a young woman, aged seventeen years, was bathing in shallow water about thirty yards from the shore when she saw a long dark form suddenly dart through the water towards her and felt the calf of her leg seized in a vice-like grip. The "shark" writhed in an endeavour to tear itself free with the mouthful it had taken, but when the girl splashed and screamed, it suddenly became alarmed, released its hold and swam away. She quickly ran ashore, where she was attended to by Dr. Bruce, of Collaroy. Her wounds, which were not severe, were dressed and she was allowed to return home. Sharks had been seen in the vicinity several weeks previously.

Dr. Bruce has kindly supplied the following information. The bite was superficial. It consisted of two double rows of tooth marks, that is, a double row for the upper and another for the lower jaw, the width of the bite being about as large as the outstretched thumb and forefinger. The wound, which healed by first intention, is represented several years later by a scarcely noticeable scar.

It is probable, though doubtful, that this attack was due to a young shark.

N.11. At Bondi, on February 8, 1929, it was a cloudy day and at 4 p.m. comparatively few people were bathing. A man, aged thirty-nine years, and a friend were swimming together just beyond them. There was a large sandbank extending from the beach for about fifty or sixty yards before coming to deep water. His friend saw the fin of a shark and immediately after this he was attacked, seized by a leg and dragged under. On coming to the surface he "stuck his hands downwards as if to ward off the brute below". Help came quickly and he was immediately carried to the beach, medical attention was given, and as soon as possible he was taken to Saint Vincent's Hospital. He died, however, before reaching hospital. There was an elliptical lacerated wound on the right thigh, extending from just below the inguinal ligament to about one inch above the knee. The wound measured fifteen inches by seven inches. The femoral artery was severed about three inches below the inguinal ligament.

N.12. At Maroubra Bay, on February 18, 1929, a boy, aged twenty years, was surfing about seventy-five yards from the shore. It was a dull day and there were about seventy people bathing at the time (3.30 p.m.); he was the furthest out, waiting for "shoots". He was heard to call out "shark, shark", and immediately two people went to his rescue and brought him ashore. A shark was seen a few minutes before the attack. He was admitted to the Coast Hospital within half an hour of the attack. Dr. McMaster has kindly supplied the following information from the hospital records.

The patient was admitted on February 18, 1929. He had been injured by a shark at Maroubra at 3.30 p.m.; he was admitted to the ward at 4.30 p.m., suffering from extensive lacerations of the external aspect of his left thigh and the inner side of both thighs. Abrasions were also present on the right leg below the knee and the foot, the left hand and the second finger and thumb were deeply scarred and over the whole hand superficial abrasions were seen.

His general condition was very bad. He was badly shocked and had lost a large quantity of blood. Bleeding was under control. He was kept under the influence of morphine; gas gangrene antiserum was given. On the following day his temperature became raised and he was unable to pass his urine. On the next day (February 20) his condition was slightly improved, but he was not quite rational at times. He sweated freely and the dressings gave him much pain. The wounds were gaping

horribly, their surfaces being very dirty and sloughing. They were irrigated with eusol. On the next day his face was very drawn, but he was taking food well. The wounds appeared to be much better and their surfaces were clearing. On the next day the patient was very much worse, very restless and irrational; he was sweating freely and his pulse was irregular. There did not appear to be any evidence of gas gangrene. On the following day his condition was worse, his face very pinched and worn. He died the next night. During the last two days his temperature rose to 39·4° C. (103° F.).

C. Newcastle.

N.13. At Newcastle Beach, on January 18, 1919, at 6.45 p.m., a shark about twelve to fourteen feet long swam amongst the bathers to within twenty yards of the dry sand and attacked a man. The shark was actually pointed out to him before he entered the water, but he laughed thinking it merely a joke. He dived into the water and a second later was struggling violently and calling for help. It is stated that he was actually torn from the shark's mouth by his rescuers and that while he was being rescued the shark made another snap at him before swimming away.

He was immediately admitted to Newcastle Hospital, where it was found that his left leg was badly lacerated, being practically torn away from the knee. His left arm was also lacerated and upon his body were several deep lacerations. His condition was critical on admission. At an operation performed later the left leg was amputated at about the knee joint. There were described four distinct bites, three on the left leg near the knee and one on the left hand. By January 20, 1919, his condition had improved and he was discharged on February 17, 1919.

The shark, it is stated, did not give him up without a struggle.

N.14. At Throsby Creek, Newcastle Harbour, on January 16, 1920, a boy, aged twelve and a half years, when about twelve feet from the shore, was grabbed by the ankle by a shark and pulled under. He struggled free and attempted to swim ashore. He had not proceeded very far when he was again attacked and seized by the leg. His cousin went to his rescue. A "desperate struggle" is said to have taken place and after a while the unfortunate boy was brought ashore. He died soon after being rescued. The flesh had been stripped from his thigh and the lower part of his leg was badly lacerated.

N.15. Whilst standing waist deep in water at Stockton Beach on January 13, 1922, a young man had his costume torn and received a wound on the left thigh. Several surfers said they saw a grey nurse shark come in behind a breaker and attack him. The wound was treated at a private hospital, where six stitches were inserted. It is believed that he made an uneventful recovery.

N.16. At Newcastle Beach on March 12, 1925, there were about forty people inshore at about 3.30 p.m., and a boy, aged sixteen years, was out about two hundred yards. Near the shore was a sandbank and a channel of calm water between the bank and the shore. He came in on a big breaker and a few minutes later swam out again to where the rollers were breaking. He was an expert surfer, and a number of people who were watching him at the time, heard him give a cry and saw half his body, with his arms waving wildly in the air, rise out of the water. His plight was realized immediately and the lifeboat was launched; by this time Mr. Lane, the lifesaver, who, showing great bravery, had donned a belt, was half way to the boy; the boy was swimming with one arm and making feeble efforts to reach the shore.

After the shark's first attack the boy could be seen attempting to fight it off with his arms, when a moment later he disappeared below the surface. After an interval he reappeared and with one arm he made feeble efforts to keep afloat. He was bitten three times. Within three minutes of his being brought ashore he was in Newcastle Hospital, which is close to the beach, but he died a few minutes after admission.

His right arm had been bitten off just below the elbow and he had extensive laceration from the left buttock along the back of the leg to the heel.

N.17. At Merewether Beach, on March 1, 1927, a boy, aged seventeen years, was attacked by a shark. According to the story of his rescuer, they were "waiting for shoots" about fifty yards from the beach, when suddenly the boy shouted, "Help, help!" and thrashed the water wildly with his hands. The surf was tinged with blood. They both came in together on a shoot for about twenty yards. The rescuer supported him and helped him in until later other assistance came.

Onlookers stated that the first bite was on the thigh, and as he turned for an instant to catch a "shoot" the shark attacked him again with lightning rapidity. It is thought that whilst trying to ward off the second onslaught he lost his thumb.

He was taken to the club room and later to the Beach Hotel, where first aid was rendered. The ambulance soon afterwards took him to Newcastle Hospital in a critical condition.

He was one of the best junior swimmers of the Merewether Club. The shark, which was said to have been a grey nurse, was later seen to be cruising up and down the shore about fifty or sixty yards from the beach.

Notes received from Dr. Rock, the Superintendent of Newcastle Hospital, are that he was admitted at 4 p.m. on March 1, 1927. His right thumb had been bitten off at the base and practically the whole of his right buttock was gone, including most of the gluteal muscles. This wound was about the size of a large dinner plate, and there were also two or three tooth marks on the medial side of the left buttock. In addition, he had a wound about the size of a soup plate higher up on the same side. This was more or less superficial, except in one place, where the sacrum was bared. His temperature was raised for about five or six weeks and the wounds were most offensive for a few days. Skin grafts were done on the following dates: March 17, 1927, March 31, 1927, April 7, 1927, April 21, 1927. The patient was discharged on September 9, 1927, and now walks without a limp.

N.18. At Cook's Hill, on April 4, 1928, there was a sandbank about fifty yards from the shore. A man went for a swim about 6 p.m. with two young ladies, who entered the water first. He swam out to the sandbank, where the water was a little over his waist. Suddenly he threw up his arms and shouted: "Help! a shark has got me." The water was seen to be tinged with blood. One of the ladies was sent for help; the other very courageously went to his assistance. He attempted to beat the shark off with his hands, but was attacked again and again. The lady, by splashing the water vigorously, evidently frightened the shark. She had great difficulty in bringing him ashore, until assisted later by two Cook's Hill lifesavers.

He was immediately taken by ambulance to the Newcastle Hospital, but died before arrival. His rescuer stated at the inquest that she felt his pulse in the ambulance and it was then beating. Notes from the Newcastle Hospital are that he "was dead on arrival in casualty about 6 p.m. on April 4, 1928. There was a very large laceration on the outer side of his right thigh, just below the hip joint, extending almost down to bone, and several superficial lacerations all down the front of both legs. His right hand was amputated at the wrist as cleanly as though done with a saw."

Another report states that the wounds on the shin were more severe and that the tibia was laid bare and displayed the teeth marks of the shark.

N.19. On the morning of October 31, 1932, a man, aged twenty-four years, was swimming in the surf at Redhead Beach, near Newcastle, when he was attacked by a shark. The shark made one attack. He was bathing alone at the time and his plight was not realized until the onlookers on the beach saw him swimming ashore in blood-stained water. On reaching the shore he was very weak from loss of blood and shock, and attempts were made to check the bleeding by those present on the beach. He was taken by ambulance to Newcastle Hospital, where he was admitted.

His wounds were lacerations of both sides of the body and to the left hand, a gaping wound under the armpit on the left side, and a great gash down the side of his

body. The left lung was exposed. On the right side there were five or six incisions, in which the marks of the shark's teeth could be plainly seen.

I am indebted to Dr. Collier, who had charge of the patient, and Dr. Rock, Superintendent of the Newcastle Hospital, for the following details.

The patient, aged twenty-four years, was brought to the casualty room at 12.20 p.m. on October 31, 1932. He had tightness of breathing. On examination there were deep lacerations on both sides of the chest, with valve action on the lower part of the left side leading to a pneumothorax. The left hand was slightly lacerated. He was pale and apathetic. His pulse was fairly good. The provisional diagnosis was shark bite and pneumothorax.

Immediate treatment consisted of pressure on the laceration admitting air. On admission to the ward his temperature was 36·3° C. (97·4° F.), his pulse was 108, and his respirations numbered 20. Morphine, 0·015 gramme (one-quarter of a grain), was given and the patient was put up on shock blocks. Fifteen hundred units of antitetanic serum were given at 12.15. Morphine, 0·015 gramme, was given hypodermically at 1.30 and 4 p.m. The wounds were treated with antivirus. Cultures were made from the wounds of both sides for examination. A skin graft was later applied to the wounds, which are now healing satisfactorily.

D. Other Parts of New South Wales.

N.20. At Pelican Island, Macleay River, fourteen miles below Kempsey, on December 8, 1919, a man swimming alone at 5.30 a.m. was attacked by a shark, which grabbed him by the calf of the left leg and twice by the foot. He fought it for some time and managed to reach shore with the flesh torn from the bone and the leg dreadfully lacerated. He climbed up a steep embankment, where he remained for half an hour, calling for help. When discovered, he was in a critical condition from hæmorrhage and shock. He was immediately taken to Kempsey Hospital. The leg was amputated the same evening, but he died the following morning.

N.21. At Port Hacking, on January 4, 1927, a young man, aged fifteen years, was bathing with a crowd of others at Grey's Point at about 11.30 a.m. Suddenly the fin of a large shark appeared several yards away. It disappeared and a few seconds later the bathers heard the boy call out. The shark had seized his leg and, struggling frantically, he was dragged beneath the surface. His head and chest appeared shortly afterwards several yards away from the spot where he had first been seized. The crowd of bathers realized that the shark was dragging him into deep water. Several swimmers went to his rescue. The shark was holding tenaciously to his leg and for several seconds one of his rescuers punched it with all his strength. Suddenly both of them disappeared and when they rose to the surface it was evident that the shark had released its hold. The rescuer was bringing the boy in when the shark made another attack, but was beaten off. A rowing boat picked them up. As an eye-witness stated, "this fact explodes the theory that a swimmer is safe from sharks amongst a crowd".

The flesh of one leg had been torn completely off, except for a small strip, from the thigh to the ankle, leaving the bones exposed, also "teeth marks" about the boy's body.

He was taken to St. George Hospital by ambulance, but was dead before arrival. The shark remained in the vicinity for some time and was said to have been about twelve feet in length.

The Reputed Man-Eating Sharks of New South Wales.

The following is a list of sharks known to occur in New South Wales waters.[27][28][29]

1. Seven-gilled shark (*Notorhynchus pectorosus*). Rare. Usually regarded as harmless, although Waite[30] thinks it dangerous. Eight feet.
2. One-finned shark (*Heptranchias dakini*[29]). Harmless. Small.
3. Port Jackson shark (*Heterodontus portusjacksoni*[29]). Very common. Harmless. Four feet.
4. Crested Port Jackson shark (*Molochophrys galeatus*[29]). Harmless. Less common. Four feet.
5. Sea shark (*Carcharhinus gangeticus*). Regarded as a ferocious species in Indian waters. Nine feet.
6. Whaler (*Carcharhinus macrurus*). Regarded as a man-eater. Twelve feet.
7. Stevens's shark (*Carcharhinus stevensi*). Rare and little known.
8. Long-nosed sea shark (*Hypoprion macloti*). One record only. Three feet.
9. Tiger shark (*Galeocerdo rayneri*). Regarded as a man-eater. Sixteen feet.
10. School shark (*Notogaleus australis*[29]). Probably not dangerous.
11. Gummy shark (*Mustelus antarcticus*). Harmless. Three and a half feet.
12. Hammer-headed shark (*Sphyrna zygæna*). Very dangerous to man.[27] Up to fifteen feet.
13. Wobbegong shark (*Orectolobus maculatus*). Not harmful to man unless it accidentally catches a wader's foot or hand.
14. Carpet shark (*Orectolobus devisi*). Not regarded as dangerous. Six to seven feet.
15. Blind shark (*Brachælurus modestus*). Harmless. Three feet.
16. Collared cat shark (*Parascyllium collare*). Harmless. Three feet.
17. Zebra shark (*Stegostoma tigrinum*). Harmless. Six feet.
18. Spotted cat shark (*Scyliorhinus analis*). Harmless. Three feet.
19. Thresher shark (*Alopias vulpinus*). Probably not dangerous. Fifteen feet.
20. Grey nurse shark (*Carcharias arenarius*). It is said occasionally to attack man. Fifteen feet.
21. Blue nurse shark (*Carcharias tricuspidatus*). Probably dangerous. Twelve feet. Doubtfully recorded from New South Wales.
22. Blue pointer or mako shark (*Isuropsis mako*). Regarded as dangerous. Twelve feet.
23. White shark (*Carcharodon carcharias*). Regarded as a man-eater. Thirty-five feet.
24. Basking shark (*Tetroras maccoyi*). Harmless. Thirty-five feet.
25. Piked dog-fish (*Squalus megalops*). Harmless, but may cause wounds with dorsal spines. Three feet.
26. Saw shark (*Pristiophorus cirratus*). Not a man-eater. Four feet.
27. Angel shark (*Squatina australis*). Harmless. Five feet.
28. Spotted angel shark (*Squatina tergocellata*). Rare (trawled). Harmless. Two feet.
29. Sawtail shark (*Figaro boardmani*). Occasionally trawled. Harmless. Two feet.
30. Swell shark (*Cephaloscyllium laticeps*). Trawled. Harmless. About one foot.
31. Blue shark (*Prionace glauca*). Suspected man-eater, doubtfully recorded from New South Wales. Fifteen feet.
32. Little blue shark (*Rhizoprionodon crenidens*). Assumed to be harmless. Over four feet.
33. Lewin's hammer-headed shark (*Sphyrna lewini*). Harmless. Four feet (average) or up to about ten.
34. Heart-headed shark (*Platysqualus tudes*). Harmless. Over three feet.
35. Deepwater dogfish (*Deaniops quadrispinosus*). Trawled. Harmless. Four feet.

Marine Industries, Limited,[31] operating in the Port Stephens district, found that the most prevalent sharks are the Port Jackson sharks, then the whaler, the grey nurse, the carpet shark, the tiger shark, and the white shark in order of prevalence.

Considerable difference of opinion exists concerning the particular sharks which attack man. The following eight sharks are suspected of being man-eaters (Figure II): the sea shark (*Carcharhinus gangeticus*), the whaler (*Carcharhinus macrurus*),

the tiger shark (*Galeocerdo rayneri*), the hammer-headed shark (*Sphyrna zygæna*), the grey nurse (*Carcharias arenarius*), the blue nurse (*Carcharias tricuspidatus*), the blue pointer (*Isuropsis mako*), the white shark (*Carcharodon carcharias*), and possibly the blue shark (*Prionace glauca*).

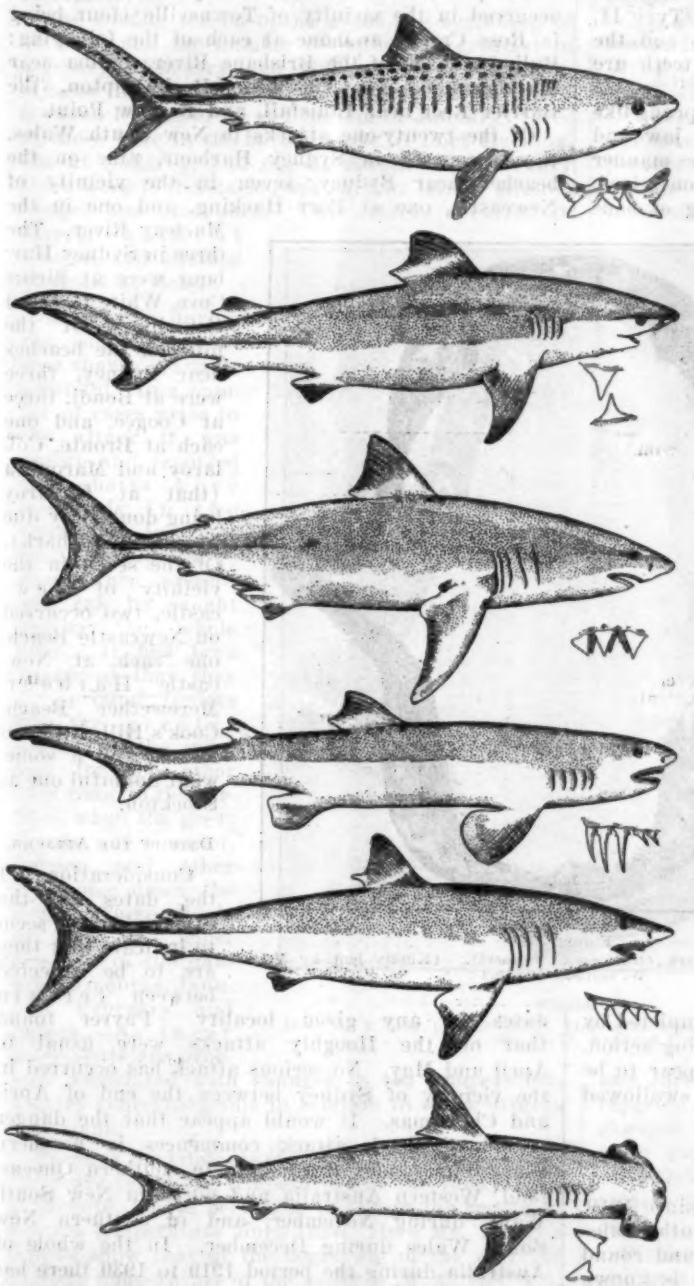


Figure II.

The commonly suspected man-eating sharks, from above downwards, as follows: (1) The tiger shark (*Galeocerdo rayneri*); (2) the whaler shark (*Carcharhinus macrurus*); (3) the white shark (*Carcharodon carcharias*); (4) the grey nurse (*Carcharias arenarius*); (5) the blue pointer (*Isuropsis mako*); (6) the hammer-headed shark (*Sphyrna zygæna*). The teeth of each species are shown behind the head of the corresponding shark.

These sharks differ in their habits (Whitley). The blue pointer or mako and the grey nurse chase their prey in the open sea, the white shark follows ships, the tiger shark cruises round as a scavenger, the whaler frequents estuaries, basks in warm shallows and even enters fresh water.

Although the grey nurse is popularly considered to be the most dangerous shark on the New South Wales coast, Mr. Whitley, of the Australian Museum, states that "the supposed responsibility of the grey nurse for most of the attacks is not based on any accurate or definite information". Some competent observers consider the whaler responsible for most, if not all, of the attacks. There appears to be very little definite evidence incriminating any particular shark. Fayrer,[2] in 1873, considered the sea shark (*Carcharhinus gangeticus*) responsible for the attacks in the Hooghly reported by him. In the only two instances that can be found in which definite evidence of the species of shark responsible for an attack on man is available, the shark has been found to be a whaler (*Carcharhinus macrurus*). In the Cottesloe Beach attack, given above, it is claimed that a tiger shark (*Galeocerdo rayneri*) was responsible, though the evidence is somewhat circumstantial. It is of interest to note, as I am informed by Mr. Roughley, that the white shark and the hammer-headed shark, both regarded as man-eaters in Australia, and a species closely allied to the grey nurse occur in American waters, where shark attacks are unknown.

The Teeth of the Man-Eating Sharks.[2][3][4]

It is first necessary to note that in the normal shark there is usually only one full row of teeth erupted, although there may be several rows of teeth towards the mid-line. If a dried skeleton of a jaw is examined, it is seen that there are from five to six rows. The other rows are unerupted teeth, which lie flat against the jaw cartilage and are covered by thick mucous membrane and apparently come into use by a series of dentitions or to replace those which may be lost (see Figure V). The erupted teeth are of great strength and strong enough to bite through small bones, such as those of the arm and forearm, and to groove large bones, such as the femur.

The teeth of the man-eating sharks vary considerably. There would appear to be two main types. In Type I, for example, the teeth of the tiger shark, the white shark and the whaler (Figures III, V, and VI), the teeth are short and roughly triangular, with sharp points and cutting edges. In Type II, for example, the teeth of the grey nurse and the blue pointer (Figures IV and VI), the teeth are long and prong-like.

In the grey nurse and blue pointer the prong-like teeth are set back at an angle in each jaw and apparently seize the part very much in the manner of two huge forks, which avulse the portion seized. This may account for the clean stripping of bone found in many instances of shark bite. Many of the victims have stated that they were caught in a "vice-like grip" and in many instances they were dragged under by the shark in the shark's attempt to wrench the bite free.

The teeth of the tiger shark, which are more or less of a serrated cutting variety, are also set back in the same way as those of the grey nurse. Their action is very similar to that of the variety just mentioned. These cutting teeth are short, whilst the prong-like teeth are long, the cutting action apparently making up for the loss in length. With the mouth fully opened, the teeth will be almost at right angles to the bite, which will be completed by a combination of a cutting and a wrenching action. With each type of teeth there would appear to be a snap bite which is wrenched free and swallowed whole.

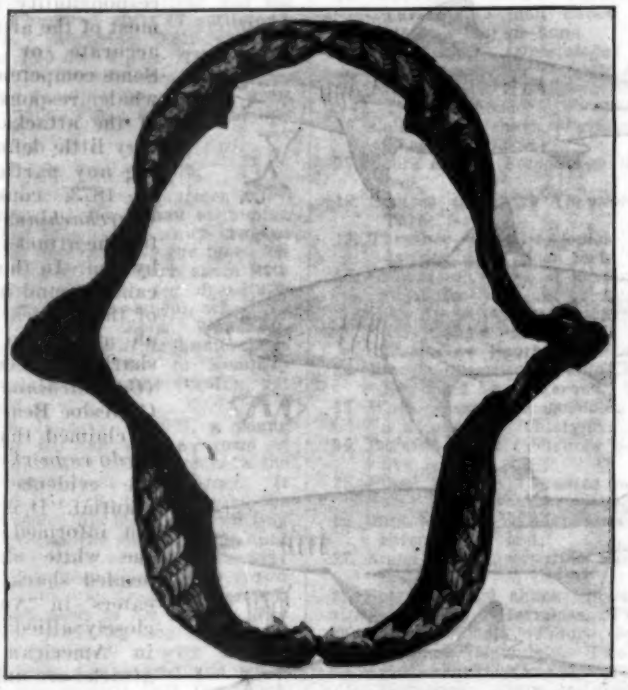


FIGURE III.
Jaws of a tiger shark (*Galeocerdo rayneri*). (Kindly lent by Mr. W. Gordon Dixon.)

LOCATION OF THE ATTACKS.

Of the thirty-eight attacks on bathers since 1919, all except five have occurred in New South Wales or Queensland. Although sharks are found round the coast of Tasmania, no shark attack is known to have occurred there. Attacks are extremely rare in South Australia, Victoria and Western Australia. Since 1919 one attack occurred in South Australia, the only one known for many years; one (perhaps two) attacks occurred in Victoria, this being the only fatal attack known in that State for nearly sixty years; and previous to the two attacks recorded in Western Australia there had been a long immunity from shark attacks.

Of the twelve attacks in Queensland, seven occurred in the vicinity of Townsville (four being in Ross Creek) and one at each of the following: Bulimba reach of the Brisbane River, Pialba near Maryborough, Yeppoon near Rockhampton, the Barrier Reef near Innisfail, and Barrow Point.

Of the twenty-one attacks in New South Wales, three occurred in Sydney Harbour, nine on the beaches near Sydney, seven in the vicinity of Newcastle, one at Port Hacking, and one in the Macleay River. The three in Sydney Harbour were at Sirius Cove, White Bay and Camellia. Of the nine on the beaches near Sydney, three were at Bondi, three at Coogee, and one each at Bronte, Collaroy and Maroubra (that at Collaroy being doubtfully due to a young shark). Of the seven in the vicinity of Newcastle, two occurred on Newcastle Beach, one each at Newcastle Harbour, Merewether Beach, Cook's Hill, Redhead Beach, and a somewhat doubtful one at Stockton.

DATE OF THE ATTACKS.

Consideration of the dates of the attacks would seem to indicate that they are to be expected between certain dates in any given locality. Fayrer found that on the Hooghly attacks were usual in April and May. No serious attack has occurred in the vicinity of Sydney between the end of April and Christmas. It would appear that the danger period of shark attack commences in northern Queensland about September, in southern Queensland, Western Australia and northern New South Wales during November, and in southern New South Wales during December. In the whole of Australia during the period 1919 to 1930 there has been no injury to men bathing by a shark attack between the end of April and the end of September, although attacks on boats, horses *et cetera* have been recorded. The most dangerous months are January and February. The freedom from attack

around Sydney between April and December is not altogether explained by the fact that comparatively few people bathe then, as many people do bathe during these months, particularly in October and November.

The surfing season opens about the beginning of October, and the number of bathers is greatest in January, February and March. Of the thirteen attacks in the vicinity of Sydney, six occurred between December 27 and the end of January; three of these were in the harbour, one at Port Hacking, one at Collaroy, and one at Bondi. In February there were four attacks, one each at Bondi, Bronte, Coogee and Maroubra. Two attacks occurred in March, both at Coogee, and another in April at Bondi.

It is also during the summer period that sharks are most plentiful. In a number of cases prior to the attack it was known and reported that sharks were frequently in the vicinity. In New South Wales waters sharks are present and can be caught during the whole year. It has been suggested that they are ground feeders for the greater period of the year, and for the other they come to the surface, when the great shoals of mullet, salmon and other fish come down the coast. These shoals of fish are most common in the dangerous months, January, February and March. As their movements are probably associated with changes in sea temperature, inquiry concerning this in relation to shark attacks was made.

Through the kindness of Mr. H. B. Treacy, who has for years taken the temperature of the Bogey Hole at Bronte, I have been able to obtain the record of the sea temperature since 1924. Here Mr. Treacy's figures show that at the beginning of the year the average temperature of the water is 20° C. (68° F.), rising throughout January to about 21·1° to 21·6° C. (70° to 71° F.), though occasionally very cold currents may considerably reduce the temperature of the water during these months, and in February, 1926, a reading of 16·6° C. (62° F.) was recorded. During March the temperature generally varies from 21·1° to 22·2° C. (70° to 72° F.) and a gradual fall occurs during April, at the end of which it is about 20° C. (68° F.). The fall continues throughout May and June, the reading at the end of June being about 16·1° C. (61° F.). The temperature is lowest in July and August, 14·4° to 16·1° C. (58° to 61° F.), with a slight rise about the end of September, becoming more marked about the middle of October, when the reading is about 17·7° C. (64° F.). The rise continues throughout November, the temperature being about 19·4° C. (67° F.) at the end of the month and through December). It is interesting to note that in six attacks which occurred in the surf within comparatively short distance of Bronte, the temperature of the water at Bronte was 21·1° C. (70° F.) or over. It would seem possible that there is some relation between the sea temperature and sharks' activity which would appear to be worthy of further investigation (see Table I).

Figure IV.
Jaws of a blue pointer shark (*Isuropsis mako*). (Kindly lent by Mr. P. D. Braddon.)

Time of Attack.

In 20 instances definite evidence of the time of the attack was obtained. Of these, fifteen occurred in the afternoon after 3.30 p.m., two occurred in the early morning, and three later in the morning.

Condition of the Beach and Surf.

Very little information is obtainable concerning the condition of the beach and surf *et cetera*. In four instances it has been reported that there was a sandbank with an inshore channel. This is the formation of the beach which many experienced surfers consider the most likely for shark attack. It would appear, however, that attacks may take place with any formation of the beach.

Whilst many surfers think that shark attacks are most likely to occur in calm water, there is no doubt that they may occur not only when there are "good shoots", but also with a heavy surf.

Attacks have also taken place in all depths of water, shallow and deep. In some instances it has been recorded that the water was shallow, in others

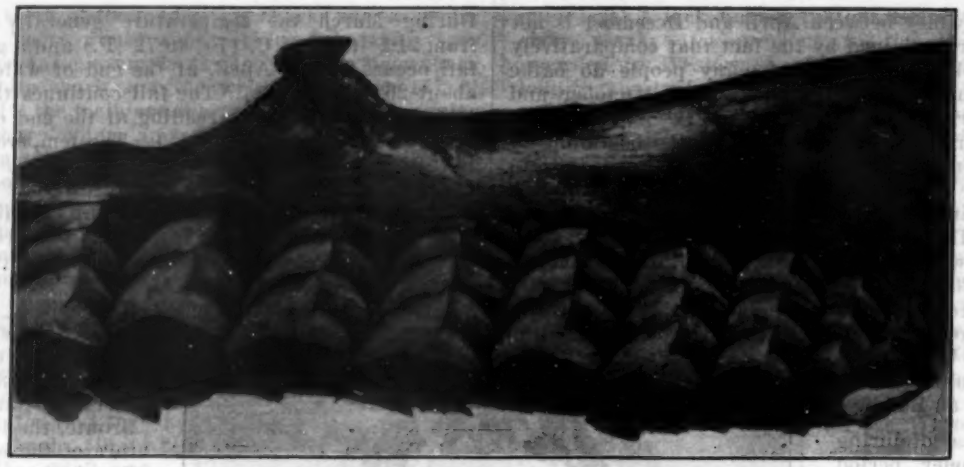


Figure V.

View of portion of the jaws of the tiger shark shown in Figure III, to show the unerupted teeth lying against the jaw.

Table I.

Table showing sea and harbour temperatures in the vicinity of shark attacks.

Date of Attack.	Site of Attack.	Temperature of Water at Bronte.	Harbour Temperature.
Jan. 10, 1919	Sydney Harbour		22·7° C. (73° F.)
Jan. 19, 1924	Sydney Harbour	20° C. (68° F.)	23·2° C. (74° F.)
Dec. 26, 1929	Sydney Harbour		22·2° C. (72° F.)
Feb. 13, 1924	Bronte	22·5° C. (72·5° F.)	
Mar. 27, 1925	Coogee	21·1° C. (70° F.)	
Apr. 14, 1928	Bondi	21·1° C. (70° F.)	
Jan. 12, 1929	Bondi	21·6° C. (71° F.)	
Feb. 8, 1929	Bondi	21·6° C. (71° F.)	
Feb. 18, 1929	Maroubra	22·2° C. (72° F.)	

The harbour temperatures are those at Fort Denison and have been supplied by the Harbour Trust.

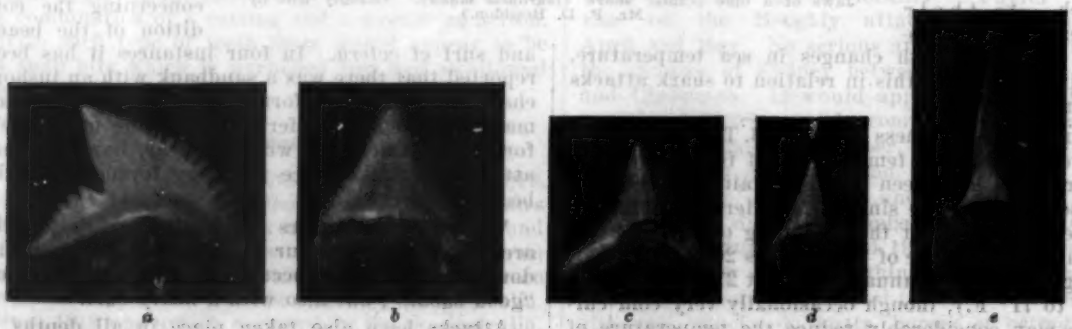
that there were three feet of water. Attacks have occurred at varying distances, from a few feet to twelve or more feet from the shore, whilst others were from one to two hundred yards out. The distance a surfer is from the shore at the time of attack undoubtedly plays an important part in his chances of ultimate recovery. On two occasions a number of men were waiting for a "shoot" when they all got it except one, who was attacked by a shark. A number of those attacked have been expert surfers, whilst one was a well-known "shark-baiter".

The Number Bathing.

In almost all the incidents here recorded the victim was either bathing alone, in a small party, or separated from the other bathers either by being well out in front of them or on the edge of a crowd. Shark attacks on one of a crowd are, however, not common. The greatest number reported to have been actually bathing at the time of an attack is about one hundred. It is also not necessarily the bather who is furthest out who is attacked. In one instance there were about forty people bathing, at least six of whom were farther out than the victim. It is also not necessarily the first to enter the water who is attacked.

The Number of Attacks on the Victim.

It has been stated that a shark attacks only once and then leaves the victim. This statement is not correct. The number of attacks on one particular victim has been recorded twenty times in the series. In only seven of these was there a single



a *b* *c* *d* *e*

Figure VI.

Isolated teeth of sharks: (*a*) the tiger shark; (*b*) the white shark; (*c*) the whaler, upper jaw; (*d*) the whaler, lower jaw; (*e*) the grey nurse.

attack, whilst in ten the shark attacked twice, and in three instances three attacks were made. There is no doubt that injury to the arms is particularly likely to occur during the second or third attack, when the unfortunate victim is attempting to ward off the shark, and even for forearms or fingers to be bitten off.

Three shark attacks attributed to the same shark[4] have been recorded in the same vicinity at Port Said on August 8, 1899, and three attacks are known to have occurred in the same vicinity in New Guinea on three successive days early in 1931. It would appear to be unusual for more than one shark to be concerned in the attack. The only instance that can be traced in which it is suggested that more than one shark took part in the attack, was in one attack at Ross Creek, Queensland, given above (Q.5), and an incident reported in the Sydney *Sun* of an attack on a native girl at Nabukera, Yasawa Islands (January 20, 1932). In this it would appear that another native girl, who was herself unharmed, almost brought the victim ashore; the victim was again dragged out of her hands by the sharks. Later only portions of her body could be found.

Rescue.

Most of the victims of shark attack reach shore, either alone or by rescue. There are many instances of the astounding heroism of rescuers and courageous determination of victims. Twelve of the victims, in the incidents recorded above, actually reached shore without assistance; fourteen were rescued by swimmers and four by boats. Where swimmers took part in the rescue there is no instance of a rescuer being attacked. In fact, there is no known instance of an attack on a rescuer, although in one incident reported above it is said that the rescuers narrowly escaped being bitten. In three instances it is reported that the victim was actually torn away from the shark by his rescuers. In this matter it is interesting to note the risks that have been taken by rescuers. In 1891 Commander W. B. Huddleston, R.N., was awarded the Stanhope Medal for conspicuous bravery. A man fell into the water amongst a school of sharks. Commander Huddleston jumped in to rescue him and in doing so actually jumped on a shark. Neither rescued nor rescuer was injured (Melbourne *Herald*, February 20, 1920).

Attacks on Natives.

A popular belief that sharks will not attack black-skinned people has given rise to the suggestion that sharks will bite a white man only on those parts of the body uncovered by a black swimming costume, a suggestion which would at first sight appear to be borne out by the facts. The idea, however, that natives are not attacked by sharks is quite erroneous. At Rabaul early in 1930 three such attacks on native boys occurred. An attack on a native boy diving for coins thrown over the ship's side occurred on January 8, 1929, at Suva. Similar incidents are known to have occurred at Colombo and Aden, and two attacks on aborigines are reported above. The idea has probably arisen from the infrequency of these attacks in waters which are known to be shark-infested. The same argument could very well be applied to white people bathing near Sydney, where the number of attacks is infinitesimal compared with the number of bathers and where large sharks are frequently seen and caught close to the bathing areas. The truth would appear to be that where sharks are in proximity to bathers, black or white, it is exceptional for a bather to be attacked.

Attacks on Dead Bodies.

Professor Cleland[10] states that Australian sharks rarely attack the dead bodies of human beings, and bases his opinion on facts supplied to him by Dr. Palmer, of Sydney, who has had unusual experience at the Sydney Morgue in this matter, and who, over a large number of years, has not found the bodies of drowned people to have been mauled by sharks. Professor Cleland further quotes the wreck of the *Greycliffe* in Sydney Harbour in November, 1927, in further support of this contention.

It is, however, known that sharks will attack dead bodies. Castellani writes:

> *Carcharias gangeticus* was for a number of years a source of great danger to the crowds at the bathing ghats at Calcutta. Sir Joseph Fayrer says that they used to feed on the partially burned bodies which were formerly thrown into the river, but when this custom was discontinued, they began to attack the people in the bathing ghats, especially in the months of April and May, when the river contains much salt water.

He says that they would dash into the crowd at the bathing ghat and inflict dangerous and at times mortal wounds, though they were seldom able to get away with their victims, because of the numerous people at the ghat.

In December, 1930, an incident occurred in Sydney Harbour which would appear to throw some light on the question.

> A woman, an inmate of one of the mental hospitals, removed all her clothing, threw herself into the Parramatta River and was drowned. When recovered, her body was found to have been mutilated by sharks. Dr. Palmer, on examination of the wounds, formed the opinion that they were caused after death.

This case was, however, unusual, in that the body was naked, whereas mostly the body had been clothed. Dr. Palmer suggests that a shark will attack a naked body, but not a clothed one. Should this be so, it would be reasonable to suppose that naked parts of the body are more liable to attack than those parts which are covered by costume. Examination of the records of attacks given above do not, however, support this, as many instances of bites on parts of the body covered by costume are recorded. Whether in these instances light or dark costumes were worn is not known.

It is obvious that the question whether Australian sharks will attack the dead body of a man is at present rather a matter of conjecture than of direct

evidence. The following occurrence, recently reported, shows that apparently they do.

On January 30, 1933, at Port Noarlunga, South Australia, two men were drowned. On the following day searchers for the bodies were moving along outside a reef parallel to the shore in a motor boat, when they saw a shark, described as a "white pointer", thirteen feet long, near the surface. It dived into some weeds and emerged with the body of one of the men. Those in the boat attempted to secure the body with grappling irons and anchors, and after some time they managed to get a set of grappling irons beneath the shark, which made a snap at the hooks. The body was caught with a three-barbed anchor and pulled to the surface, but not before the shark had made an unsuccessful attempt to regain it.

The Wounds Caused by the Bite.

Several types of wounds are found. The bite or bites due to the teeth are obvious. In some cases they are clean-cut and saucer-like, and even bone may be taken off flush with the soft tissues. Evidence of the wrenching action is often seen. The wound is lacerated, muscles are stripped from the bone, a clean bony surface, often indented with tooth marks, being left with muscles hanging down over the joint.

Besides these injuries there are frequently found a number of others, usually multiple skin abrasions, and often arranged in definite long rows. These are usually described as tooth marks. In some cases this would appear to be so, but in most it is probable that they are due to the impact of the shark's fin or hide against the victim's body. The hide of the shark is unusually rough and is studded with numerous microscopic papillæ, each of which is capped with dentine. The hide is noted for this character and is used commercially as shagreen. Some of the wounds, especially when they are linear, and other lacerations would appear to be most easily explained by attributing them to the shark's fins or the impact of its body rather than to the bite.

To sum up, it would appear probable that saucer-shaped wounds on the legs, body and shoulders, and amputations of the feet and arms are caused by the actual bite of the shark; that the regular series of abrasions so often seen are due to the impact of the rough hide of the shark, whilst straight lacerations and wounds are possibly due to the terrific impact of the shark's lateral fins. Actual tooth marks are sometimes seen, as in the case reported by Wassell,[14] a photograph of which accompanies his description, showing that a native's head had been inside the shark's mouth; and teeth marks were seen also in the case reported by Miller,[9] and in Figures VII and VIII.

Analysis of the Wounds.

For the purpose of this analysis, those cases in which men have disappeared and are supposed to have been taken by sharks are excluded, as are also the cases in which fishermen have been injured after the shark has been caught.

In all except two some injury to the legs or buttocks occurred, and in thirteen this was the only injury received. Multiple injuries were received in fifteen instances. In one case both arms only were injured. When one considers the shark's view of the victim wading or swimming, the frequency with which the legs and buttocks are attacked is not surprising. Injury to the arms would appear to

Figure VII.
Photograph of shark bite in the side of chest from the left side. The main bite is seen on the right in the process of healing. The teeth marks appear to have been made from within outwards.

be particularly liable to occur in the attempt to ward off the shark, especially on the second or third attack. In seven instances the right arm or thumb was amputated by the bite.

Figure VIII.
The same patient as in Figure VII, from the right side, showing the teeth marks of the shark.

Of the thirty-eight instances the end result in five is not known. Among the remaining thirty-three, twenty-four patients died and nine recovered. Among the five cases in which the end result is not

known, one patient (Q.10) has probably recovered; the other (Q.12) is still under treatment.

Of the twenty-four who died, all but two are known to have been brought ashore, eleven died soon after rescue, in two no details are known. The remaining nine were admitted to hospitals; of these four died soon after admission. Death was post-operative in three instances; two patients died from sepsis, one after a considerable interval. The majority of deaths occurred within four hours of the attack from shock and hæmorrhage. In five of the deaths the injuries were so severe as to be rapidly fatal in spite of any treatment, and in five others it is probable that the femoral artery or one of its larger branches was torn.

Of the nine persons who recovered, three had injuries which were comparatively slight; amputation including the bitten area was performed on four. The two others both had wounds of the buttocks; they recovered, in one case after three months and in the other after nine months and several operations for drainage, skin graft *et cetera*.

The Mortality Rate.

Of the thirty-three attacks in which the end result is known, only nine persons recovered, giving a mortality rate of roughly 73%. Of the nine who recovered, three had minor injuries and in two of these instances there is some question whether sharks or smaller fish were responsible. If these be omitted and adjustments be made for the two probable recoveries, the mortality rate is about 80%, which is probably nearer the correct figure.

The Treatment of Shark Bite.

It is obvious that death will frequently be inevitable from the severity of the wounds received, and is particularly likely to occur when severe wounds about the body or tearing of the main femoral or brachial arteries occurs. Further, the distance of the patient from the shore at the time of attack, the rapidity of rescue, and particularly the promptitude with which hæmorrhage is effectually controlled, may turn the scales towards death or recovery. The control of hæmorrhage should undoubtedly be attempted at the earliest possible moment, and there is reason to believe that one patient owes his recovery to compression of his severed femoral artery actually during rescue.

At all times this arrest of hæmorrhage must be the prime consideration, not only of arterial hæmorrhage. It is probable that large quantities of blood may be lost from venous and capillary bleeding, as undoubtedly the continual washing away of the effused blood by the salt water must interfere with and delay the process of natural arrest of hæmorrhage. Immediately the patient is brought to the water's edge or pulled into a boat this should be attended to. If the wound is on a limb and at all large or serious, a tourniquet should be applied above it. Where this is not possible, a large clean towel should be tightly packed into the wound.

The wounds should be covered with a large towel or the cleanest material available and at the same time examined to determine whether any fracture of bone has occurred in the wound; if so, this should be splinted. Meanwhile the patient should be covered with blankets or towels and removed to the nearest shelter, by stretcher if possible.

After arrival at the club house or other shelter, reexamination of the effectiveness of the control of bleeding should be made, the patient's costume should be removed, his skin dried, and the treatment of shock immediately carried out by warmth or whatever other means are available.

The usual hurry in the general excitement to have the patient sent to the nearest hospital is probably not always to the best interest of the patient. He should undoubtedly be seen as soon as possible in the shelter by a medical man, who should make certain that all bleeding is controlled and that the treatment of shock has been properly instituted. The doctor should also make arrangements with the hospital for admission and, in serious cases, for immediate transfusion. The question whether a patient should remain for some length of time at the shelter, as has been advocated by Stacy,[36] must depend on the type of shelter and on the facilities for medical attention and nursing care.

When the patient arrives at hospital, he should be immediately put to bed, warmth should be applied and the control of hæmorrhage again checked. The wet costume, if not already removed, should be taken off and his skin dried. The wounds should not be disturbed at this stage, except to control hæmorrhage, and not until the patient's condition improves. An immediate or continuous transfusion of saline solution or gum saline solution should be given in all serious cases, a continuous administration by the rectum of glucose should be commenced and a hypodermic injection of morphine given. When necessary, this should be followed by a transfusion of whole blood. As soon as the patient's condition permits and the presence of tourniquets demands, the wounds should be examined and the further treatment decided.

This will be easily decided in some instances, where, for instance, as frequently occurs, arms or lower limbs are badly lacerated, joints opened and fractures present. Amputation should be performed as soon as practicable. When amputation has resulted from the bite, reamputation should be done. In fact, the quickest and most satisfactory recoveries have occurred in such cases. No treatment is required for the superficial abrasions often seen, beyond powdering them with dry tannic acid powder.

The most difficult decisions are required in cases of large bites, usually on the buttocks, where large portions of flesh are removed, a gaping cavity being left. These, if accompanied by other injuries, are not fatal in themselves, but in all instances become very infected, and in about half the instances have resulted in death from sepsis. A foul-smelling sepsis, very suggestive of gas gangrene, may occur, and in all cases the wound has a most offensive odour. This type of sepsis would appear to be

common to all large bites, whether by sharks, animals, or even men. On the west coast of Africa the Kru men bite one another in their quarrels. The wounds are usually serious, and even the slightest scratch may lead to severe inflammation, although their teeth may be in excellent condition. I have known a slight scratch from a shark's tooth to cause a rapid and severe lymphangitis. It would seem that the wounds, which are in many ways analogous to the large shell wounds seen during the war, should be treated on the same principles and often by excision. From examination of this type of wound recorded above, it will be seen that in one instance (N.5) a severe and rapidly fatal sepsis followed; in another (N.12) death from sepsis followed after a long interval; whilst one of the Brisbane (Q.3) and one of the Newcastle patients (N.17), each after a long interval of sepsis and several skin graftings, recovered. An instance of tetanus following the bite of a shark is quoted by Cleland. This occurred in preantiseptic days, and there must be some doubt whether the tetanus was due to the actual bite. Although the sepsis which follows the bites is probably in most instances carried into the wound by the shark's teeth, the opportunities for secondary infection are very many during rescue and transport to hospital under the conditions in which shark victims must necessarily be handled. In the present state of our knowledge the prophylactic injection of anti-tetanic and gas gangrene antiserum on admission to hospital appears to be indicated. Probably one of the most remarkable recoveries is that of the patient illustrated (Figures VII and VIII) who had a pneumothorax following the bite.

In conclusion, it would seem obvious that the mortality of these injuries will always remain high, as, apart from the fact that many of the patients are moribund when they reach shore, the all-important immediate treatment upon which recovery frequently depends and which would test the skill of a highly trained casualty surgeon, almost invariably rests with someone with little or no experience.

Summary.

1. Attacks by sharks have been reported from many parts of the world and have been known to occur since ancient times.

2. The evidence that sharks will attack man is complete, although in most of the attacks reported the evidence is circumstantial.

3. Sharks will attack horses, boats and people bathing.

4. A number of attacks on fishermen drawing nets are recorded, and injuries not infrequently occur after a shark has been landed.

5. Instances where men have disappeared and are believed to have been taken by sharks are recorded.

6. Since 1919 twelve attacks on people bathing have occurred in Queensland, two in Victoria, one in South Australia, two in Western Australia, three in Sydney Harbour, nine on the beaches near Sydney, six in the vicinity of Newcastle, and two in other parts of New South Wales.

7. Of thirty-four varieties of sharks known to occur in New South Wales waters, eight are suspected of being man-eaters. In the two instances in which definite evidence of the species of attacking shark is known, the shark has been a whaler (*Carcharhinus macrurus*).

8. The attacks occur mainly during certain months at any given locality. There is reason to believe that shark attacks are influenced in some way by sea temperatures.

9. Attacks may occur at any time of the day, but are more common after 3.30 p.m.

10. Any formation of the beach may be found at the time of an attack, which may take place in shallow or deep water, at the water's edge or a considerable distance from the shore.

11. Those bathing alone or on the edge of a crowd are most liable to be attacked. Attacks on a crowd are uncommon.

12. It is usual for the shark to make more than one attack on its victim. Arms and fingers are particularly liable to be taken off during the second or third attack.

13. In many of the instances recorded sharks have been known to have been in the vicinity prior to the attack.

14. Almost all shark victims are rescued. There is no known instance of a rescuer being attacked.

15. Sharks will attack dark-skinned races.

16. Though there appears to be some doubt, it is almost certain that sharks will attack dead bodies.

17. The wounds are usually multiple; other wounds are caused in addition to the bite.

18. In almost all instances some injury to the buttocks or lower limbs has occurred.

19. The mortality rate of shark attacks is between 73% and 80%. Many of the wounds received are in themselves fatal.

20. In the treatment, the first aid treatment, particularly the immediate arrest of hæmorrhage and the treatment of shock, is of paramount importance.

21. Severe sepsis sometimes follows from the bite, which in itself may be fatal, but not in all cases. Prophylactic injections of gas gangrene antiserum and antitetanic serum are advisable.

Acknowledgements.

I wish to acknowledge my indebtedness to Mr. Gilbert Whitley, Ichthyologist, The Australian Museum, Sydney, for the scientific details and nomenclature of sharks, many references, and for checking over the proofs; to *The Sydney Morning Herald* for many references to the attacks and the use of their library; also to the Melbourne *Herald*, the Melbourne *Argus*, the Brisbane *Courier* and the Sydney *Sun* for dates and references. I would also thank Dr. Sandford Jackson, of Brisbane, who made

it possible to secure details of many of the Queensland attacks, and for much other information; Dr. Rock, of the Newcastle Hospital; Professor Cleland, of Adelaide; Mr. T. C. Roughley, of the Technological Museum, Sydney; Mr. Powell, Librarian of the Royal Society of Medicine, London, for references; Mr. Louis Schaeffer, for the excellent photographs; Mr. Farrell, for his drawings; and the many others mentioned in the text who have supplied details *et cetera* of the attacks.

REFERENCES.

(1) F. Ensor: "Shark Bite in South Africa", *The Lancet*, June 19, 1886, page 1160.
(2) J. Fayrer: "Clinical and Pathological Observations in India", 1873.
(3) J. Lloyd T. Jones, European General Hospital, Aden: "Interesting Case of Shark Bite at Aden", *The British Medical Journal*, Volume II, 1898, page 897.
(4) William Bryce Orme: "Three Cases of Shark Bite", *The British Medical Journal*, Volume II, 1899, page 1534.
(5) C. R. Baker and C. W. Rose: "Report of a Case of Shark Bite", *United States Navy Medical Bulletin*, Volume XVI, 1922, pages 881-883.
(6) J. A. Guthrie: "Three Cases of Shark Bite", *New York Medical Journal*, Volume LXXVI, 1902, pages 897-898.
(7) Middleton Stuart Elliott: "An Authentic Case of Injury by a Shark", *Medical Record*, Volume LX, 1901, page 391.
(8) Charles Haskin Townsend: *Bulletin of the New York Zoological Society*, Volume XXXIV, Number 6, November-December, 1931, pages 163-173.
(9) Harold Miller: "A Non-Fatal Shark Bite", THE MEDICAL JOURNAL OF AUSTRALIA, Volume II, 1920, page 101.
(10) J. Burton Cleland: "Records of Australian Cases of Shark Bite", *Journal of Tropical Medicine and Hygiene*, October 1, 1931, page 230.
(11) J. Burton Cleland: *Australasian Medical Gazette*, September 14, 1912, page 270.
(12) J. Burton Cleland: THE MEDICAL JOURNAL OF AUSTRALIA, October 4, 1924, page 359.
(13) J. Burton Cleland: Sixth Annual Report of the Microbiological Laboratory (Government Bureau of Microbiology for year 1915, in report of the Director-General of Public Health of New South Wales, page 270).
(14) Charles Wassell: "A Rare Result of an Encounter with a Shark", THE MEDICAL JOURNAL OF AUSTRALIA, July 31, 1920, page 103.
(15) H. H. Field Markell: THE MEDICAL JOURNAL OF AUSTRALIA, December 4, 1920, page 525.
(16) A. G. Foster: *Royal Australian Historical Society Journal and Proceedings*, Volume X, Part 2, 1924, page 117.
(17) Tom Iredale, R. A. Johnson and F. A. McNeill: "Destruction of Timber by Marine Organisms in the Port of Sydney", published by the Sydney Harbour Trust, Sydney, May, 1932, page 76.
(18) Herodotus, VI, 44.
(19) Pliny: "Natural History", Book IX, Chapter 70.
(20) Philip F. Alexander: "The Earliest Voyages Round the World, 1519-1617", 1916, page 6.
(21) "The Fugger News-Letters", Translation by Pauline de Chary, 1924.
(22) Pennant: *British Zoology*, 1776 Edition, Volume III, page 106.
(23) *Sydney Gazette*, July 20, 1806, page 4, column 1.
(24) W. Renner: "Penetrating Wound of the Abdomen by a Sword Fish", *Journal of Tropical Medicine*, Volume VI, 1903, page 119.
(25) Day: "Fishes of India", Volume I, Part IV, 1878, page 728.
(26) E. W. Gudger and C. M. Breder: "The Barracuda (Sphyræna) Dangerous to Man", *The Journal of the American Medical Association*, June 16, 1928.
(27) Allan R. McCulloch: "The Fishes and Fish-Like Animals of New South Wales", Second Edition, with additions by Gilbert P. Whitley. Published by the Royal Zoological Society of New South Wales, 1927.
(28) G. P. Whitley: "Sharks", *The Australian Museum Magazine*, Volume III, Number 1, January-March, 1927, page 13.
(29) G. P. Whitley: "New Names for Australian Fishes", *The Australian Zoologist*, Volume VI, Part IV, February 13, 1931.
(30) Macgillivray: "Voyage of the Rattlesnake", Volume I, 1852, page 49.
(31) T. C. Roughley: "Catching Sharks for Profit", *The Australian Museum Magazine*, Volume III, Number 5, January-March, 1928, page 149.
(32) G. P. Whitley: "The Teeth of Fishes", *The Australian Museum Magazine*, Volume IV, Number 3, July-September, 1930, page 92.
(33) Ridewood: "Teeth of Fishes", *Natural Science*, Volume VIII, 1896, pages 380-391.
(34) G. P. Whitley: "The Sawfish", *The Australian Museum Magazine*, Volume III, Number 1, January-March, 1928, page 21.
(35) Waite: "Fishes of South Australia", 1923, page 24.
(36) H. S. Stacy: "Modern Treatment as Applied to Post-Operative Pulmonary Complications and Accidents of the Beach", THE MEDICAL JOURNAL OF AUSTRALIA, May 21, 1932, page 737.
(37) Otto von Kotzebue: "A Voyage of Discovery into the South Sea and Beering's Straits", Volume I, 1821, page 348.

Reports of Cases.

CARCINOMA OF THE APPENDIX IN A GIRL AGED NINETEEN.

By SYDNEY ALLEN, F.R.C.S. (Edinburgh),
Honorary Indoor Surgeon, Women's Hospital, Melbourne.

THE following case appears to be of sufficient interest to warrant a report.

Miss C., aged nineteen years, single, was admitted to the hospital on July 14, 1932. She had been admitted to the hospital two years previously with what had been diagnosed as acute appendicitis, but she refused operation and was allowed to go home. Since that time she had had many mild attacks of pain in the right iliac fossa, but had never vomited. Twenty hours before admission there was a sudden onset of acute pain in the right iliac fossa, which had persisted since. She did not vomit, but complained of nausea during the previous ten hours. Her bowel actions had been quite regular. She had no urinary symptoms. Her appetite had been poor. Sleep had been fairly good and she had not lost any weight. Her menstrual periods had been quite regular, but she had had dysmenorrhœa with excessive loss with each period.

She was a well nourished girl, apparently in good health. Her temperature was 37° C. (98·6° F.) and her pulse rate 90. Her heart, lungs and central nervous system were apparently normal. In the abdomen there was some tenderness and rigidity in the right iliac fossa, but no mass was palpable.

On July 15, 1932, I opened the abdomen through a right paramedian incision. The appendix was found bound down to the pelvis with the omentum adherent around it. The distal inch of the appendix was bulbous and cystic, and the appendix was removed. On opening the appendix a small mass at the distal end was found. It was about the size of a cherry and was fairly circumscribed. The pathologist reported carcinoma of the appendix.

PLANE TREE LEAVES A CAUSE OF SEASONAL ASTHMA AND HAY FEVER.

By DAVID ZACHARIN, M.B., B.S. (Melbourne),
Honorary Clinical Assistant to Out-Patients, Melbourne Hospital.

THE rather unusual observation that plane tree leaves may be a cause of asthma and hay fever merits a report of the following case. Plane trees are quite commonly found in and about Melbourne as ornamental trees lining streets and in the parks and gardens.

The patient, a male, J.H., aged thirty-five years, is an employee of a suburban council. His duties include the pruning of trees in streets and gardens in that municipality. He stated that whenever he was employed in the pruning of plane trees in summer, he became afflicted with hay fever and attacks of an asthmatic type. Other trees did not affect him, nor did plane trees do so at any other time of the year.

On investigation of the leaves and seed balls of this tree, it was found that the leaves at this season of the year are covered with a layer of downy material. Cutaneous scratch tests were done with a watery suspension of this material, with a suspension of pollen from the seed ball of the tree, and with cocksfoot and rye grass pollen extracts. The only positive reaction was a marked one to the downy material from the leaves.

There has been no opportunity as yet to investigate the clinical significance of this reaction by attempting to desensitize the patient by injections of an extract of this substance.

Reviews.

VOCATIONAL GUIDANCE.

Few people are better fitted to write on the psychology of vocational guidance than Angus Macrae, who, under the caption, "Talents and Temperaments", gives a readable *résumé* of this important topic.[1]

Dr. Macrae is head of the Vocational Guidance Department of the National Institute of Industrial Psychology, London.

The first chapter deals with the problem of the tragic misfits which occur from vocational maladjustment. Not only does it produce grumblers, malcontents and inefficients, but there also ensue serious losses in industry. He quotes the famous words of Pascal, "*La chose la plus importante à toute la vie est le choix du métier; le hasard en dispose*". The science of measuring intelligence devolves chiefly on a description of the methods of Binet-Simon, Spearman, and the American tests used in the world war, together with performance tests such as employed in cube construction, the Dearbourn formation and Cox's models. The author clearly indicates their limitations and places a proper stress on the estimation of temperament and character. To obtain a true estimate of personality, recourse must be made to every available avenue, including parents, teachers and social workers.

The task of vocational guidance is indeed involved and requires the service of highly trained vocationalists. In skilled hands the results are remarkable, as shown by the London experiments. Under test conditions a far higher percentage of contented workers was found in controlled groups than in those employed under haphazard methods.

It requires no great stretch of imagination to visualize a time when a much greater percentage of young adolescents will be placed in occupations to which they are fitted.

The book contains a number of case histories showing occupational maladjustment. One of the most pathetic contains the record of a student with poetic leanings, who, under the spell of beautiful words such as "systole" and "diastole", took his degree in medicine. When the time arrived for practice, he forsook that of medicine for other fields. An account of such misfits could be indefinitely prolonged.

That Australia has paid attention to the problem is shown by the mention of the excellent work done by Martin and his collaborators in Sydney.

Those who wish for a well written *résumé* of a new field of investigation which will eventually solve one of the greatest bugbears of parenthood, to wit, the choice of a career for offspring, will find many valuable suggestions in "Talents and Temperaments". The book deserves a wide popularity.

PHYLAXIS.

"Phylaxis", a small monograph, is one of a series of recent books by well known French workers translated into English in order that those English medical readers who have not the time or knowledge to refer to the original writings can learn to appreciate better the exact work and experiments which have influenced modern French medical opinion.[2]

G. Billard, the originator of the conception of phylaxis died with his work uncompleted. This interesting exposition from his pen is merely introduced and partially developed in these pages and is then suddenly broken off. The reader is left curious as to what has since been done by his pupils towards a settlement of the many interesting possibilities regarding intracellular chemistry and defence, covered in this new term. "Phylaxis" is described by the author as the principle that "no substance can permeate a cell unless it is soluble in the lipoid constituents of that cell. But, if these lipoids are first saturated by a preparatory phylactic agent they become incapable of receiving the toxic agent." According to Billard, therefore, anaphylaxis occurs as a result of "rupture of this lipoidal equilibrium, whereby colloidoclasic foreign substances can enter the cell structure". Egg albumen, for instance, is split into its lipoid and non-lipoid fractions. The former only, though heterogenous to the host, is allowed to enter the cell structure, and remains to facilitate at a later date the passage of the completely foreign or non-lipoid fraction into the cell, producing the rupture referred to, and so the resulting anaphylactic phenomena. The truth of this hypothesis was proved by experiments in which lipoids extracted from foreign serums were injected into guinea-pigs. When subsequent injections of whole "foreign" serum were given, anaphylactic shock invariably resulted. When the order of injection was reversed no anaphylactic phenomena occurred.

Billard was led to his conception of phylaxis in the first instance by the observation that sparteine protected guinea-pigs, temporarily at least, from the effects of the neurotoxin of viper venom, even to as much as ten times the minimum lethal dosage. He found further that by dissolving the sparteine in certain mineral waters he could completely nullify its poisonous effects. Guinea-pigs injected with these waters would resist lethal doses of tetanus or viper toxin. He also proved that one neurotoxin would neutralize the effects of another, if given in a certain order. He was careful not to use the word "immunity" in his later writings, as this already had a limited and well defined medical meaning, involving the production of specific antibodies, an aspect which he was anxious for the moment to ignore. The later experiments, both *in vivo* and *in vitro*, in these directions are fully described. In these days, when cell physiology and metabolism are subjects of increasing interest and investigation as the ultimate solution of growth disease and defence problems, Billard's conception of phylaxis is most attractive. He should be acknowledged as a far-sighted worker who showed remarkable tenacity in the pursuit of his innumerable experiments.

This little book is most lucidly expressed, is stimulating and persuasive. A word of admiration should be accorded to the translator, Dr. Hugh Gainsborough.

[1] "Talents and Temperaments: The Psychology of Vocational Guidance", by A. Macrae, M.A., M.B.; 1932. London: Nisbet and Company, Limited. Crown 8vo., pp. 220. Price: 5s. net.

[2] "Phylaxis", by G. Billard, M.D.; 1931. London: Kegan Paul, Trench, Trubner and Company, Limited. Demy 8vo., pp. 89. Price: 14s. 6d. net.

Notes on Books, Current Journals and New Appliances.

THE MEDICAL QUARTER OF LONDON.

Dr. Cyril Phillips Bryan has written a book entitled "Roundabout Harley Street", which will be of interest to medical practitioners and to all lovers of London.[1] The name Harley Street does not cover the range of the book. Wimpole Street, Queen Anne Street, Cavendish Square and Portland Place, Wigmore and Welbeck and Weymouth Streets, and many others are included. The author describes historical incidents connected with each centre and discusses the famous personages "whose presence or patronage served, even momentarily, to lift the district, the streets, the houses, out of the common rut". Stories of famous medical practitioners are told and also stories of famous quacks. Tyburn tree, the site of thousands of deaths, is described. The history of the word Marylebone is stated: St. Mary-atte-bourne became St. Mary-at-burn; then with an added French flavour the name became St. Mary-le-bonne and thence St. Marylebone. St. Mary was the patron saint of the church at Tyburn. The name was degraded by "no less an æsthetic than Samuel Pepys" to Marrow-bone, "a sordid appellation by which many a cockney and most of the costers still know it in this year of grace". The book is most interesting and contains a wealth of historical information; it is assured of a prosperous life.

[1] "Roundabout Harley Street: The Story of Some Famous Streets", by C. P. Bryan, M.B., B.Ch.; 1932. London: John Bale, Sons and Danielsson, Limited. Crown 8vo., pp. 272. Price: 5s. net.

The Medical Journal of Australia

SATURDAY, APRIL 15, 1933.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

AIR TRAVEL AND QUARANTINE.

History shows that infectious diseases are transmitted from one locality to another, from one country to another, along paths taken by human travellers. It would be a simple matter to give many instances in which the occurrence of this passage has been proved. Public health experts have in the past foreseen the possibility of the advent of infectious diseases, when, owing to increased speed of travel or adoption of shorter routes, infected ports have been brought, as it were, within striking distance of healthy ports. When the Suez Canal was opened for traffic, Australian medical officers thought that disease would more easily reach Australian shores. And at the present time, when travel by air from one country to another is becoming a matter of everyday occurrence, regulations are made in an attempt to prevent the spread of disease. Articles have been written on the subject of air travel and the spread of disease, and a book has recently been published by Dr. Arthur Massey, Medical Officer for the City of Coventry, England, on the same subject. Australia is situated in what may be regarded as a potentially dangerous position. Her northern shores are close to eastern countries where cholera, plague, dysentery, smallpox and other diseases are rife. It is well that Australian people should know what provisions have been made for their protection.

In the issue of *Health* (the journal of the Commonwealth Department of Health) for February, 1933, disease risks from overseas air traffic are discussed. As far as traffic by sea is concerned, it should be noted that within the average incubation period of smallpox (twelve days from the date of infection to the development of symptoms) a vessel can reach Thursday Island from such ports as Rangoon, Bangkok, Hong-Kong and Shanghai. The incubation periods of cholera, plague and yellow fever are covered by a seven days' range, and this brings within reach the nearer ports of Java, Borneo, the Celebes and the southern Philippine Islands. This means that an infected person who joins a vessel at ports in these zones may reach Australia before he is obviously ill. In the article in *Health* Australian experience in regard to smallpox is quoted. During the twenty-four year period, 1909 to 1932, seventy persons with smallpox were brought to Australia on shipboard. Of these five came on board ship ill; twenty-three developed symptoms within seven days after leaving the infected port; thirty-two developed symptoms between the eighth and twelfth day at sea; and ten after the twelfth day at sea. The careful and systematic way in which the Quarantine Regulations of the Commonwealth have been enforced on sea-going vessels has provided adequate protection to the Australian people. The question will naturally be asked whether the same protection exists as far as air travel is concerned.

The present position regarding quarantine and air travel may be summed up in the statement that the quarantine code of the Commonwealth is applicable to aircraft. In 1920 the definition of a vessel subject to quarantine was extended to "any ship, boat, or other description of vessel or vehicle used in navigation by sea or air". Every arrival by air is subjected to quarantine examination and surveillance. With the inauguration of passenger services in the not far distant future quarantine examinations of arrivals by air will cease to be sporadic and surveillance will no doubt be more difficult than it is at present. It must be

remembered that the work of the quarantine officers of the Commonwealth Department of Health is simplified by the activities of the Eastern Bureau of Epidemiological Intelligence at Singapore which transmits, at regular intervals, information about the incidence of infectious disease and their spread —the Commonwealth Health authorities know at any given moment the exact state of the public health in any of the far eastern countries. Doubtless as time goes on it will be necessary to take steps to induce the Australian people to submit in greater numbers to vaccination against smallpox, if not against other diseases; when that time comes the health authorities will find the members of the medical profession behind them to a man. In the meantime people may rest assured that the Commonwealth Department is alive to the problem of disease risks associated with air travel and that ample provision exists for all present emergencies.

Current Comment.

ALCOHOL AND DRUG ADDICTION.

In civilized communities the problem of addiction to alcohol and drugs is of serious moment. The aborigines of the central areas of Australia had a drug of addiction, but remained good tribesmen. The natives of the mountains of Peru and Bolivia consumed the coca leaf, apparently with benefit, but the civilized drug addict is not generally a worthy citizen. It has been stated that the effect of alcohol on character is always to reduce the inhibitions against antisocial conduct. There is an intimate relation between alcohol and poverty, crime, venereal disease and infantile mortality. The effects of alcohol on character are more marked in those inherently unstable. Alcohol may be a contributing factor, but not the essential cause of admission to hospitals for the insane. Generally alcohol and drug addicts are not normal persons, hence the difficulty in effecting a cure. Many begin their addiction from injudicious medication at the hands of medical practitioners. L. Kolb found that 86% of addicts were unstable before the habit was acquired. A common type was the care-free person, devoted to pleasure, seeking new sensations and excitements. The drug addict and inebriate in common struggle with a sense of inadequacy. There is a longing, satisfied by alcohol or drugs, without which expression might be found in some useful or innocent emotional outlet. Relapse is due to the cause responsible for the original addiction—an abnormal nervous constitution, with inferiorities and pathological strivings. In the early stages most addicts wish to be cured, but later the effort becomes half-hearted and the hope for cure diminishes. Addicts are not always phlegmatic, but more often have quick perception, acute sensibility and higher attributes of the mind. Neurotics, like cats, belong to the sympatheticotonic group. They easily tire of strain and anxiety in the fight for existence and take anything to secure relief. Both drug addicts and alcoholics are psychopaths before addiction.

J. R. Rees has contributed an article on psychological factors in the prevention and treatment of alcohol and drug addiction.[1] He states that there is no fundamental difference between the psychology of the alcoholic and that of the drug addict. Differences of opportunity may explain the method in which people indulge themselves. Often the drug addict is less intelligent than the alcoholic. To such the mental stimulation of drugs is a motive for action. Rees apparently takes no account of the increasing number of addicts to hypnotics of the barbituric acid group, which give no stimulation. He states that most unsolved problems vexing the psychoneurotic may lead to alcohol or drugs. But for every such breakdown there is a cause, the discovery of which may modify the situation and lead to cure. In treating addictions it is imperative to try to remove the "guilt sense" attaching to the state. Most patients are held to be guilty and worthless by their friends and relatives. Often addicts, not seeing that their trouble is a definite illness (a mental or emotional disorder), cannot make a serious start to recover. Their own will power is insufficient; they need help. It is easy to withdraw the drug or alcohol, but far more difficult to treat the addiction itself. Rees holds that psychological methods may help even while alcohol or drugs are being taken, provided the dose is not great enough to render the patient mentally incapable of cooperation. Naturally, it is best to remove the drug entirely. If possible, the cause of the maladjustment should be ascertained. If the patient can be made to realize his own problem and to recover the repressed emotion associated with the origin of his trouble, he will have been placed in a position to solve the problem without artificial aids or evasions.

Rees, in his advocacy of mental analysis, states that the necessary methods vary from careful anamnesis to detailed deep analysis (the psychoanalysis of Freud). Between these two methods are those which make use of free association and dream interpretation. Rees also lays stress on the influence of the patient's environment and discusses many problems connected with environment. He urges a counsel of perfection, more easily written about than put into practical application. No amount of encouragement or exhortation will eliminate a sinister heredity or convert a sympatheticotonic individual into one of vagotonic type. Often the physician himself paves the way for addiction, in prescribing for asthma, pain or

[1] *The Lancet*, October 29, 1932.

insomnia. When sedatives are needed the patient should not be informed as to the drug employed and he should never be given them to use himself. Lack of opportunity of getting the drug may lead to cure. All legislative enactments are composed of compulsions and prohibitions which will remain necessary as long as mankind exists. Psychotherapy must be accompanied by restriction of the sale of alcohol and drugs. The experience of prohibition in the United States of America is quite beside the mark. It is true that control of conduct alone, whereby the exercise of choice is prevented, is courting disaster. The addict's character must be altered. R. R. Peabody has observed that of alcoholics as a class certain groups are unfitted for psychotherapy: psychotic subjects, those who do not sincerely wish to help themselves, and sometimes those with psychopathic personalities or constitutional inferiors. It is important to remember that drug addicts can never be cured by deceit, that is, by giving water in place of their addiction drug.

THE MORTALITY FROM HÆMATEMESIS.

The belief is widespread that death hardly ever occurs as a result of gastro-intestinal hæmorrhage, that hæmorrhage is arrested spontaneously just when matters seem at their worst. Statistics show, however, that this optimism is not justified. Seven years ago Ernest Bulmer recorded the mortality among all patients suffering from urgent hæmatemesis who were admitted to the medical wards of the General Hospital, Birmingham, between January, 1902, and July, 1926. Among a total of 526 such patients 67 deaths occurred. The mortality among patients in whom acute peptic ulcer was diagnosed at autopsy was 8·3%, and among those with chronic ulcer 11·6%, giving a total mortality for all types of ulcer of 10·7%. These figures must surely give rise to serious consideration. Of a group of 25 patients suffering from hepatic cirrhosis, eight died. Of seven patients admitted while bleeding from gastric cancer, six failed to recover. No relationship was noted between the severity of the hæmorrhage and the anatomical site of the ulcer. Two patients affected with acute ulcers died after surgical treatment. Contrary to the usual statement, it was found that the mortality was twice as high among males with acute ulcers as among females. No fresh information emerged from a study of the site of the chronic ulcer or of its age incidence in relation to the bleeding. Here again male patients preponderated. Only two of nineteen patients who ultimately succumbed gave a history of a previous attack. The gross mortality among 111 patients with acute and chronic ulcers in the second period, 1926 to 1931, was 13·5%, an increase of 3% on the preceding seven years.[1] It was not possible to account for a high or low mortality by differences in treatment adopted. The usual standardized medical *régime* included the administration of morphine, rectal injections of saline solution, starvation followed by the use of alkalis and Sippy's diet. Bulmer prefers to make no comments on his figures, he gives no further details of treatment, nor does he state what, in his opinion, are the indications for surgical interference. Guides to surgical treatment are urgently needed, and in another article W. E. Chiesman[1] describes those relied upon at Saint Thomas's Hospital. He first review the recent literature on mortality from hæmatemesis. Thus Paterson found a mortality of 11·8% in London; Hinton, at the Bellevue Hospital, New York, quoted a mortality of 20% among 52 patients with gross hæmorrhage; Ross, in Melbourne, gave a mortality of 58% among 45 patients treated medically. Chiesman's figures cover the admissions to Saint Thomas's Hospital during the period 1925 to 1931, inclusive. The mortality among 137 males was 27%, a figure equivalent to that representing the death rate following perforation. No new method of treatment, such as Hurst's scheme of washing out the stomach with ice-cold water, was employed. Autopsies on 45 patients with recurrent hæmorrhage revealed the common cause to be an eroded vessel in a callous ulcer. Many of these patients had a history of dyspepsia of ten years or more, but in one instance the history covered a period of only three weeks. The shortest time from the onset of bleeding until death was forty-eight hours; the longest, one month. Chiesman concludes: "In general, medical treatment should be given a fair trial in cases of severe gastric hæmorrhage. . . but there certainly seem to be cases in which surgical intervention should be seriously considered." With the first part of this statement all will agree. No one would suggest for a moment that all such patients should be operated upon as soon as admitted to hospital. This raises the question as to whether the aid of the surgeon should be invoked at all. The surgeon generally complains that if he is summoned, he is summoned too late. Obviously the surgeon must determine whether the patient should be operated on, but the physician should be equally familiar with the probabilities of surgical cure. If operation is to be considered, it must be considered at the earliest possible moment, particularly if the patient has failed to respond to initial treatment by morphine and absolute rest. The patients submitted to operation will be those who give a typical and long history with a recent increase in the severity and continuity of their pain. Such patients will be found to have a bleeding vessel in a callous ulcer; and it must be remembered that medical treatment of this type of ulcer is by no means always satisfactory. The technique adopted at operation need not be discussed; it will suffice to state that skill and experience are indispensable. Such operations are not for the occasional operator. Only by early and adequate medical treatment and, in the circumstances we have indicated, by the closest cooperation between physician and surgeon, will the mortality from hæmatemesis be reduced.

[1] *The Lancet*, November 1, 1932.

[1] *Ibidem.*

Abstracts from Current Medical Literature.

MORBID ANATOMY.

Colonic and Rectal Polyposis.

Strauss (*Deutsche Medizinische Wochenschrift*, August 19, 1932) states that intestinal polypi are rare, but in practice very important, and can be classified into (*a*) solitary and (*b*) multiple. Multiple polypi may extend over a wide area of the colon and exceptionally involve the small intestine. Occasionally the numbers may reach 500 to 1,000. In 17,000 *post mortem* examinations Staemmler found 116 cases (0·7%), of which 85 were solitary and 31 multiple. Massive polyposis is rare and may extend only over a localized area. Contrary to general opinion, intestinal polypi are less common in children, for Bokay found in 60,000 children only 25 cases (0·04%). Carcinomatous changes are relatively common in massive polyposis (25% to 50% of these cases). Even solitary polypi undergo malignant changes.

Effects of Radium.

Joan M. Ross (*The Journal of Pathology and Bacteriology*, November, 1932) reports a case illustrating the effects of the prolonged action of radium. A woman, aged forty-four years, was admitted to hospital for carcinoma of the left breast. On April 4, 1929, twenty-six radium needles were inserted into the breast. On April 10, 1929, twenty-five of the needles were removed and it was found that the thread of one of the needles had been broken. Several attempts were made to find the needle and X ray examination revealed its presence in the pericardium. The condition of the patient was so unsatisfactory that a prolonged search could not be made and the patient was eventually discharged from hospital. The patient was kept under observation. The author gives an account of her symptoms and clinical findings. She eventually died on April 13, 1932, three years after the needle was lost. At *post mortem* examination the needle, which had a wall thickness of 0·5 millimetre of platinum and which contained two milligrammes of radium, was found embedded in the interventricular septum of the heart. The pericardial cavity was almost entirely obliterated by firm adhesions. A zone of necrotic heart muscle extended round the needle for a radius of 3·75 centimetres (one and a half inches). The changes in the heart muscle were apparently due to alterations in its blood vessels. In the spleen and lymph adenoid tissue there was: (*a*) proliferation and activity of macrophages, (*b*) loss of follicular structure of lymphoid tissue, (*c*) an absence of lymphocytes, (*d*) a replacement of lymphocytes by plasma cells. The author suggests that these changes were the result of vascular disturbances induced directly or indirectly by radiation. After one year there was a lymphopenia, relative and absolute. This is held to have been due to deficient production and to metamorphosis of lymphocytes into plasma cells. The liver was found to contain a malignant hæmangioendothelioma in a zone immediately subjacent to the needle. In the lungs and bone marrow metastases were present. The origin of the tumour could be traced to the endothelial lining of the branches of the portal vein. In the opinion of the author, the tumour arose indirectly from the action of prolonged irradiation on the vessel near the surface of the liver. The author concludes that the case affords additional evidence that the necrotizing and carcinogenic action of radiation results from the susceptibility of the blood vascular system to irradiation.

Vitamin Deficiency and Lesions of the Nervous System.

H. M. Zimmermann (*The Journal of Experimental Medicine*, February 1, 1933) in an investigation of lesions of the nervous system in vitamin deficiency, has fed rats on a diet low in vitamin *A*. The diet consisted of casein, corn starch, crisco and Osborn-Mendel salt mixture number IV. The following changes were produced in the nervous system: There was a degeneration of the medullary sheaths of the brachial plexuses and sciatic nerves, and less often of the vagus nerves. Such lesions were not found in the optic nerves. There was degeneration of the medullary sheaths of the sensory tracts on the periphery of the spinal cord and in the posterior columns. Much less frequently similar lesions were found in both the crossed and uncrossed pyramidal tracts. There were also changes of the same nature in the posterior nerve roots and less frequently in the anterior nerve roots of the spinal cord. Evidence was adduced to indicate that the changes in the sensory tracts of the spinal cord followed those in the posterior nerve roots. There was a close relationship between the appearance of such symptoms as muscular weakness and incoordination and the occurrence of changes in the nervous system.

Experimental Liver Disease Produced by X Rays.

A. Bolliger and K. Inglis (*The Journal of Pathology and Bacteriology*, January, 1933) point out that the effects on the liver by radiation by X rays have not been accurately determined. They also state that irradiation of the entire liver cannot be carried out without affecting the gastro-intestinal tract, the radiosensitivity of which is very pronounced. They have exposed the livers of dogs by surgical operation, and after shielding the other organs, have given a single massive dose of X rays to the liver. The immediate result of such irradiation is necrosis of the parenchymatous tissue of the liver, especially near the surface, but also deeper in the substance of the organ. If the animal survives the immediate damage to the hepatic parenchyma, death from liver insufficiency occurs at a later date. In their series this was from five to sixteen months after irradiation. The prominent histological changes in the liver are connective tissue overgrowth of long standing and necrosis of comparatively recent date.

Nerve Fibres and Malignant Tumours.

G. M. Ryrie (*The Journal of Pathology and Bacteriology*, January, 1933) writes on the significance of nerve fibres in human malignant tumours. He has investigated a series of eleven carcinomata obtained at operation. Axis cylinders were demonstrated with Gross-Bielschowski's silver impregnation method. He found that when portion of a nerve is destroyed by the advancing neoplasm, numerous new fibrils grow from the living axis cylinders of the proximal stump of the nerve trunk. These new axis cylinders not only grow within the perineural tube of the proximal portion, but penetrate into the neoplastic tissue. The process is exactly similar to the process that occurs after section of a peripheral nerve. The author can see no reason why the newly formed axis cylinders should be thought to exert any trophic influence on the neoplastic cells.

The Fate of Endometrial Emboli.

V. C. Jacobsen (*Archives of Pathology*, January, 1933) has studied the fate of autologous endometrial tissue introduced into the venous circulation of eleven rabbits in the resting stage of the sexual cycle, in "heat", *post partum* and during pregnancy. He performed laparotomy, removed about one centimetre of a uterine horn, curetted this portion and suspended the scrapings in three cubic centimetres of homologous blood serum at room temperature; he then injected the suspension into the rabbit's ear vein. Histological studies of the tissues were made 30 seconds, 12 hours, 24 hours, 48 hours, 1 week, 1 month, 69 days, 79 days, 109 days and 130 days later. The animals, except two which died of embolic shock thirty seconds after the injection, remained in good health during the entire period of their survival. The bulk of the cellular material was apparently filtered out in the pulmonary arterioles and capillaries, no adventitious cells being found in the heart, spleen, kidneys or liver. Embolic cells, apparently viable, could be recognized one week after injection, but none could be identified after that time. Stromal cells were thought to survive longer than epithelium. Fibrin was deposited about the cell emboli, their cytoplasm gradually disappeared and the nuclei became pyknotic and were disintegrated, the embolus becoming converted into a hyaline

mass in the smaller vessels and organized in the larger arterioles. As a result of complete autolysis the pulmonary vessels were cleared of the autologous cell masses and there was no suggestion of the formation of new endometrial tissue. The author points out that his results are in agreement with the distribution of the characteristic lesions found in human ectopic endometriosis. He adds that while Sampson has found a venous dissemination of endometrial tissue within the human uterus and possibly in the groin, no instance of metastasis on non-neoplastic endometrial emboli has yet been observed above the diaphragm.

MORPHOLOGY.

Afferent Impulses from the Blood Vessels of the Pia.

M. LEVINE AND H. WOLFF (*Archives of Neurology and Psychiatry*, July, 1932) state that it is probable that the nerves of the pial blood vessels convey afferent as well as efferent impulses. In addition to their physiological significance, such afferent impulses may be of importance in the genesis of certain headaches and convulsions.

Corticofugal and Association Fibres Arising from the Cortex of the Vermis of the Cerebellum.

L. BENDA (*Archives of Neurology and Psychiatry*, July, 1932) gives an account of a study of the secondary degeneration of the nerve fibres resulting from lesions in the cerebellum of dogs. She found it possible to trace by the Marchi method: (i) short cerebellofugal fibres from the cortex to the central nuclei, (ii) long cerebellofugal fibres in four tracts to the various parts of the brain stem, and (iii) intracerebellar association fibres to other parts of the paleocerebellum. The short corticofugal fibres from the superior part of the vermis pass mainly to the roof nuclei. From the inferior part they pass mainly to the globoid nuclei, and there is also a definite well-formed tract to the phylogenetically oldest part of the dentate nucleus. The long corticofugal fibres from the vermis may be classified as follows: (i) Fibres that enter the brachium conjunctivum to end in the opposite red nucleus or in the mesencephalic root of the fifth nerve. (ii) Perforating fibres that pass directly from the cortex to the vestibular nuclei, reticular formation, grey matter accompanying the posterior longitudinal bundle and descending tract of Deiters' nucleus. (iii) Fibres that arise from the most anterior part of the vermis (especially from the lingula) and take a position between the central nuclei and ventricle when some of them decussate. (iv) Fibres of similar origin that take a position dorsal to the central nuclei, where they form a partial decussation. From here they pass to the lateral surface of the retiform body, where they ascend and descend and course as external arcuate fibres to reach the nuclei of the raphé at all levels and possibly all the olives. This is the bundle of the dorsal decussation. Intracellular association fibres connect all parts of the paleocerebellum (vermis and flocculi), but these are least numerous in the oldest parts and most abundant in the phylogenetically younger intermediate parts (that is, the *lobulus medius medianus* of Ingvar).

Genesis of Hortega Cells.

K. ISHIKAWA (*Folia Anatomica Japonica*, March, 1932) gives a review of the work done up to the present on Hortega cells, and discusses the theories which have been advanced as to their origin. He claims to have proved that Hortega cells can be subjected to vital staining almost in the same manner as in the histiocytic cells of body organs; that the reaction to Hortega cells towards products of decomposition, foreign bodies, and especially iron, is much the same as that of the histiocytic cells and adventitial cells. He states that the Hortega cells are found proliferating in the organising area of the complete necrosis of nervous parenchyma even after the formation of the definite limiting membrane. He believes that the facts which he has illustrated will help to support Hortega's theory, and he also believes that Hortega cells are of mesodermal origin.

Bilateral Absence of the Trapezius Muscle.

D. SHEEHAN (*Journal of Anatomy*, October, 1932) gives an account of the occurrence of complete absence of the trapezius muscle. A tendinous insertion of the deep fascia of the posterior shoulder region into the spine of the scapula could be isolated on the right side. The sterno-mastoid muscle appeared normal on the left side, but was weakly developed on the right.

Fusion of Epiphyses with Diaphyses.

H. FLECKER (*Journal of Anatomy*, October, 1932) points out that statements of the various anatomical authorities show considerable discrepancy regarding the ages at which the various epiphyses appear and fuse with their respective diaphyses. He has, therefore, undertaken a Röntgenographical examination of a large series of living subjects in an attempt to obtain an accurate account. His results are submitted in a comprehensive series of tables. In his various descriptions the following points were especially noted with reference to each sex: (*a*) the youngest subjects where the epiphyses in question were found to be present, (*b*) ages at which the majority of the epiphyses in question were present, (*c*) oldest subject in whom epiphyses had not yet appeared, (*d*) youngest subject where epiphyses were found to be fused with the diaphyses, (*e*) ages at which the majority of the epiphyses were found fused, (*f*) oldest subject in whom epiphyses had not yet fused.

The Mechanostructure of the Pericardium.

G. POPA AND E. LUCINESCU (*Journal of Anatomy*, October, 1932) describe the orientation of the collagen fibres within the pericardium. This orientation is determined by various mechanical factors, mostly forces of traction outside the pericardium and pressure inside the pericardium. All these forces are produced by some general functions of the body—respiratory movements and movements of the spinal column. In the fundamental structure and orientation of fibres in the pericardium, its relations with the diaphragm, the attitude of the body and the type of respiration are of the greatest importance. The posterior part of the pericardium must be considered as a reinforcement of the atrial walls and also as a fixation mechanism for the lung roots. Considered as a unit, the pericardium plays a very important rôle in the distribution and redistribution of blood volume between certain large territories of the body. By the arrangement of its insertion the pericardium protects the large blood vessels against systolic shock.

The Bushman Brain.

I. SLOME (*Journal of Anatomy*, October, 1932) states that the most outstanding so-called primitive feature which appears constantly in the brains of Bushmen is the exposure of the insula. There is a tendency towards other primitive features, shown particularly well in one or two of the five hemispheres examined, but not constantly in all, namely, pronounced *rostrum orbitale*, curvature of the rhinal fissure, retention of the *sulcus lunatus*. The general appearance and proportions of the brain are such as one would expect from the characteristic configuration of the Bushman cranium, for example, pronounced parietal width, frontal and occipital flatness. There is a high degree of dolichocephaly. The total brain weights and the weights of the hemispheres are very small, being lower than that of any other living race recorded.

Sensory Neurones in the Ventral Spinal Nerve Roots.

J. O'DONNELL AND W. WINDLE (*Anatomical Record*, Volume LV, 1933) find that the ventral spinal nerve roots in the lower lumbar and sacral regions of seven adult cats contain sensory type nerve cells varying in number from 275 to none at all. Most of these neurones have no processes coursing in the nerves to the leg. Occasionally a small but significant number in some of the nerves undergo chromatolysis after section of the branches of the lumbosacral plexus.

Special Articles on Treatment.

(Contributed by Request.)

VI.

TREATMENT OF IRITIS.

The first step in the treatment of an eye suffering from iritis is the instillation of a few drops of cocaine solution followed a few seconds later by two or three drops of *liquor atropinæ sulphatis*. While the atropine is acting the history of the case can be more minutely investigated. To digress for a moment, Dr. E. L. Gault, in a most kindly and courteous letter, took me to task for "advising the use of atropine as a help in the diagnosis of a doubtful case of iritis", pointing out the danger of confusing it with subacute glaucoma, and the disastrous results which follow the use of atropine in these cases. I entirely agree with Dr. Gault that the utmost care should be exercised in this connexion and also that we should diagnose iritis before using atropine, but if to err is human, so it is human often to be uncertain. So in dealing with youths and young adults with a muddy iris and a small pupil when we feel that iritis is present, but are not absolutely certain, I still think it is correct, if not imperative, to use atropine and settle the question. In other words, there is more risk in omitting atropine in suspicious cases in young people and allowing the pupil to be bound down than in using it in a few cases where there may be nothing more serious present than conjunctivitis. In older patients, approaching fifty and over, when the diagnosis is doubtful, more precautions must be observed; the tension of the eye should be taken, and if a mydriatic is used it should be one less potent than atropine, such as homatropine. The patient should be more particularly under observation, the effect watched, and eserine should be at hand to use if necessary.

To return to our patient, in whose eye we have instilled some atropine, we get the story of his life. Has he syphilis? If the answer is in the affirmative, we get corroboration and believe him. If in the negative (or better in any case), a Wassermann test should be carried out. If the result is positive, he should be treated. Speaking personally, I hand him over, no doubt weakly, to the syphilologist, howbeit keeping a jealous guard over the eye itself. Our more virile and self-confident colleagues in general practice, conversant with the kaleidoscopic changes in modern treatment, will probably themselves carry out the antisyphilitic therapy. In a series of 203 cases of iritis I brought before the Australasian Medical Congress of 1920, syphilitics accounted for only 8% of the number. Next we question our patient about his teeth. Probably he says they are quite all right, although he may have many amalgam stoppings, numerous golden crowns, and possibly bridges. Without his knowing it, his mouth may be, to quote a French author, a golden mausoleum of corruption. The true state of affairs can be determined by an X ray examination of the teeth taken by an independent expert. Most of us have seen quite dramatic improvement following the extraction of a few septic roots. The patient's nose and throat should be examined and, if thought necessary, a specialist's report obtained and acted upon. The digestive, urinary and reproductive systems should not escape investigation; some writers attach special importance to prostatic infection. It is usual and proper to ask the patient if he has any signs of rheumatism. The lay mind is inclined to be somewhat cloudy and inaccurate on this subject, and possibly the same applies in some respects to the medical mind. Leaving out rheumatic fever, most of the other forms of rheumatism are now comprised by the term *arthritis deformans*, which, Osler says, is secondary to a focus of infection somewhere. So it seems that rheumatism and iritis are not in a causal relationship, but are each manifestations of a similar infection. Sometimes they are present together, but, fortunately for the sufferer, more often one or the other is absent.

In spite of all our searching, however, in a large percentage of our patients no assignable cause of the iritis can be discovered. In the series mentioned above the cause was unascertained in 70%.

The moral derived from this is that attention should be directed to the local treatment of the eye and the general treatment of the patient as best indicated.

The eye in which the cocaine and atropine were instilled should be inspected in about half an hour. If the pupil is moderately well and evenly dilated, a favourable prognosis is justified, and one drop of atropine three times a day during the attack will be sufficient to maintain dilatation. If, however, the pupil shows no sign of dilating or perhaps a partial movement at one spot, a further instillation of cocaine and atropine should be given and the eye examined again after an hour. Even now there may be no dilatation or perhaps the pupil may present the fantastic shape of partial dilatation, showing the presence of synechiæ. A further instillation of atropine should be given. I would warn the practitioner against the perfunctory ordering of a bottle of atropine, a drop to be instilled three times a day (expressed often by the weird formula "t.d.s."), and telling the patient to return in three or four days, or perhaps in a week. What happens? Through nervousness or clumsiness the solitary drop of solution falls mostly on the lid, what may go in is violently squeezed out on general principles, and the patient may ultimately return with an undilated iris and an occluded pupil. The time spent in seeing that the pupil is dilated is well spent. It is not fussiness, but imperative necessity. If the practitioner has not, or thinks he has not, the time for such detail, he should send the patient to someone who has, or leave the patient in charge of a skilled nurse with definite instructions in the use of atropine. A good plan is to instil a drop every two minutes for five instillations and to repeat this every two or three hours. Sometimes atropine in ointment acts better, and occasionally the solid form has been used. In obstinate cases atropine must be pushed to its point of tolerance, but if at all possible the pupil must be dilated. Should the adhesions be obviously quite fixed and the result of previous attacks, it is useless to go on with excess of atropine.

A few patients are found with marked intolerance to atropine. After its use for a few days they develop swelling, redness, and eczema of the eyelids and face. Duboisine or hyoscine may be tried as a substitute; or the surgeon may himself instil a few drops of atropine once daily, maintaining digital pressure on the lachrymal sac for five minutes after the instillation.

In the meanwhile other measures need not be neglected. The patient is ordered to bed, frequent hot fomentations are applied over the eye and a mixture is ordered, containing 1·2 grammes (twenty grains) of salicylate of sodium and 2·4 grammes (forty grains) of citrate of sodium, to be given every two hours. A purgative also is usually administered.

Pain in iritis varies considerably. Sometimes it is hardly present, especially after the pupil is dilated; in other cases it is extremely severe, requiring some sedative, such as Dover's powder, to promote sleep. Three leeches, now, alas, banished from the British Pharmacopœia, as well as from the shelves of the apothecary, applied near the outer canthus, have been instrumental very often in relieving pain. In severe cases improvement has followed a course of milk injections; six to eight cubic centimetres are generally given on alternate days for five injections.

The subjects of iritis are often very nervous and depressed, and it is bad practice to make them more miserable than necessary. It seems a pity to sentence them to the loneliness of a private hospital; if they have a comfortable family bosom, let them remain in it. There is no need for a dismal and dark room, though at times the patient may prefer a subdued light. A pair of shaded spectacles are useful. The attack will almost certainly last at least four weeks, and during the latter part of the time the patient may engage in simple tasks, though he cannot read or tax himself in any way. As a general rule he may be comforted with a favourable prognosis.

There is one form of iritis that is a source of anxiety and difficulty to the medical attendant, namely, when it

is associated with high intraocular tension. Such cases tax one's skill, experience and courage. The best treatment can be determined only by a careful study of each particular case. Should iritis be the marked feature and the pupil still undilated, atropine should be kept up in spite of the high tension. But when the pupil is large, atropine may be found to aggravate the condition unless its use is associated with repeated paracenteses of the anterior chamber. In rare instances, when the secondary glaucoma is the urgent feature, operative treatment is called for, and corneo-scleral trephining may be the operation of choice. An unpleasant feature of iritis is its tendency to recur. Many patients have repeated attacks with intervals varying from one to ten years, and with our present knowledge it is impossible to instruct the patient how he can avoid further attacks. An iridectomy during an interval does not prevent recurrences, though it may have some advantage in rendering less likely occlusion of the pupil. The best we can advise our patients is particular care of their health generally, to avoid over-eating, to live temperately and wisely, and to seek early medical advice for any trouble with the throat or teeth or for any complaint likely to form a focus of infection.

When the attack is over the refraction should be estimated and suitable glasses ordered if necessary.

J. C. HALLIDAY, M.B., Ch.M. (Sydney), F.R.C.S. (Edinburgh), D.P.H. (Cantab), F.R.A.C.S.,
Honorary Consulting Ophthalmic Surgeon, Royal Prince Alfred Hospital, Sydney.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE SECTION OF CLINICAL MEDICINE OF THE SOUTH AUSTRALIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held in the Bice Building, Adelaide Hospital, Adelaide, on August 17, 1932. The meeting took the form of a series of clinical demonstrations.

Post-Pneumonic Empyemal Sinus Communicating with the Colon.

DR. C. J. CLOSE showed a man, aged forty years, who had been in the medical ward in December, 1931, with influenzal pneumonia. He was readmitted in January, 1932, with empyema of the left thorax. A portion of rib was resected and the cavity was drained in the usual manner.

In April, for no other reason than some slight delay in the closure of the sinus, Dr. Close had the chest examined by X rays after the injection of bismuth paste into the sinus. To his surprise the descending and transverse colons were filled with the bismuth, though no track was noted from the skin surface to the colon. As no fœtor of the discharge had been noted, Dr. Close had the pus cultured in the laboratory, and the report was "*Staphylococcus aureus* only". Referring to his ward notes, he found that this was the only organism obtained from the pus at the time of evacuating the empyema.

Dr. Close said that it appeared that the communication with the bowel (probably somewhere in the neighbourhood of the splenic flexure) was a valvular one, so that no gas or even organisms were admitted into the sinus. It was impossible to imagine that this communication had anything to do with the persistence of the sinus, which, as a matter or fact, was fast closing, remaining closed for a few weeks at a time and opening to discharge a little pus for only one to three days. It was also difficult to understand how the colic fistula had arisen, since there had been no signs of intraperitoneal mischief before the date of the empyema, and a barium meal given after the bismuth injection indicated a perfectly normal bowel.

Dr. Close showed other skiagrams of the empyema and of the pneumonia.

A further bismuth injection was given and an X ray examination was made later to confirm the first, and the same filling of the colon was again noted, though more force was necessary to project the paste into the bowel.

Chronic Duodenal Ileus.

Dr. Close also showed a man, aged fifty-five years, who had been treated medically for ten years for duodenal ulcer and had three times spent periods in the medical ward of the Adelaide Hospital. X ray examination had persistently revealed a large five-hour residue, some irregularity of the duodenal bulb, and duodenal ileus. The last skiagram taken in April, 1932, showed the ileus very well.

At operation nothing abnormal was found in the stomach or first part of the duodenum, but on lifting up the transverse colon the empty third part of the duodenum was plainly seen through the thinned and adherent mesocolon, to sag into the greater compartment of the peritoneum, so that it seemed to be an intraperitoneal viscus when full. The walls were also scarred and thickened, as if the site of chronic inflammation or even ulceration.

A duodeno-jejunostomy was performed, and the relief to the patient was immediate; a day or two afterwards he claimed that he had never been so free from discomfort since his treatment began.

Dr. Close explained that the patient was on full diet and was putting on weight. Although four months was not very long to claim a cure, it was evident that the operative treatment undertaken was necessary. The patient complained only of vague pains in the iliac fossæ, mostly the left, which Dr. Close attributed to his coloptosis, which the X ray examination also indicated, and which no doubt was the main factor in causing the compression of the third part of the duodenum by the superior mesenteric vessels.

Primary Granulopenia.

DR. N. T. M. WIGG showed a patient who was suffering from primary granulopenia. This case was reported in the issue of April 1, 1933, at page 407.

Intraocular Aneurysm with Ocular Signs.

DR. G. H. B. BLACK reported a case of intraocular aneurysm with ocular signs. This report was published in the issue of April 8, 1933, at page 434.

Medical Societies.

THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING OF THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA was held at the University of Adelaide on November 4, 1932.

Thyreoidectomy in Herbivora and Carnivora.

MR. R. H. MARTSON discussed the difference of the symptoms supervening on thyreoidectomy of herbivora and those which follow extirpation of the gland in carnivora, and said that they might well be explained on anatomical grounds, as the close proximity of the thyreoid and parathyreoids in carnivora rendered the removal of one singularly difficult without simultaneous removal of the others, whereas, in the ungulates, for example, a subsidiary pair of parathyreoids existed which were so far removed from the thyreoid as to escape destruction when the latter was removed.

Mature merino sheep suffered little untoward effect after thyreoidectomy, other than a materially decreased basal metabolic rate. Young lambs varied in their response to the removal of the thyreoids. While some rapidly regenerated new thyreoid tissue and evidenced little difference in behaviour subsequent to the operation, others took on the conformation and behaviour of typical cretins. The basal metabolic rate, growth and wool fleece production of the latter animals were considerably reduced. The

histological appearance of the glandular residues when these were small was one of hyperactivity and the iodine percentage of such fragments was low.

No myxœdematous infiltration could be detected in the operated lambs, but the amount of wool produced was considerably decreased and the fleece was definitely drier.

While thyreoidectomy reduced the production of wool fleece, extirpation of the pineal gland certainly materially increased this. Whether or not the increase was brought about through a permanent peripheral vasodilatation was yet to be settled.

Jaundice Following Transfusion of Blood.

Dr. McLaughlin then described two cases in which jaundice had occurred after transfusion with compatible blood.

He commenced by describing the reticulo-endothelial system and outlining McNee's theory of jaundice. He then spoke of the various adverse reactions that may occur after blood transfusion. In the cases mentioned jaundice was noticed on the third day after transfusion with compatible blood, there was bile in the urine, and a direct Van den Bergh reaction was obtained. Hæmoglobinuria did not occur, nor was there any interference with kidney function.

In one case daily intramuscular injection of liver extract was commenced on the day of the transfusion. The hæmoglobin value rose from 21 (average normal 100) to 35 after the transfusion and was maintained, and no rise occurred in the reticulocyte count till three days after the jaundice was noted.

Dr. McLaughlin asked for suggestions as to the cause of the jaundice. Superficially, he said, it would appear that, as the hæmoglobin had been maintained and the reticulocyte increase had not occurred before jaundice was observed, the source of the bilirubin was not the transfused blood cells.

A general discussion then took place, and though many helpful suggestions were made, it was agreed that insufficient data were available for a definite solution of the cause of the jaundice to be made.

The question as to whether the jaundice was obstructive or hæmolytic in origin was discussed. It was said it was very difficult to understand how a bland substance such as blood serum could react on the liver to cause an obstruction. As there was no hæmoglobinuria, it seemed clear that if the jaundice were hæmolytic the destruction must have occurred, not in the blood stream, but intracellularly.

Both patients had large active spleens, and it was thought possible that in such cases intracellular destruction of transfused red cells might rapidly occur.

Obituary.

GEORGE CUSCADEN.

Sir George Cuscaden, whose sudden death has been announced in this journal, was the son of the late William Henry Cuscaden, of Alexandra House, Wexford, Ireland, and was born in 1857. His early medical education was at Mercers Hospital, Dublin, but he finally qualified at Edinburgh in 1880. After a period spent as an assistant in London, he went to Dominica as a colonial surgeon, where he developed a tropical abscess of the liver, for which he was invalided home. For some years he was a ship's surgeon, starting on the West Coast of Africa and later on a western ocean liner. As a transport surgeon he went to the bombardment of Alexandria, and after that a chance remark caused him to come to Australia on the *Port Darwin*. After a short period in practice at Port Wakefield in South Australia, he started in Urana, in New South Wales, and after a few years came to Melbourne about the time of the great financial crisis of 1890. In addition to having a large general practice he was a Councillor and Mayor of Port Melbourne. He was appointed to the Women's Hospital in 1906 and became senior surgeon, a consulting surgeon and a member of its Board of Management. Many will remember him as a teacher at the hospital. For many years he had a consultant practice in Collins Street in obstetrics and gynæcology, for which his wide experience in general practice, as well as in the Women's Hospital, so well fitted him. In 1912 he was elected to the Melbourne City Council as representative of the Latrobe Ward and in 1929 was made an alderman. With a short intermission he was a Commissioner of the Metropolitan Board of Works from 1914 to 1932. During these years he represented these bodies on various organizations and was a member of many subcommittees with interests from the Spencer Street Bridge to the centenary committee. He will be remembered as President of the Baby Health Association and Chairman of the Health Committee of the City Council. He was in the forefront of any health movement of importance in the last twenty years. He was a member of the Board of Management of Heatherton Sanatorium and the Queen's Memorial Infectious Hospital and had been chairman of both. He was a member of the Council of the Victorian Branch of the British Medical Association and a past president; he was a foundation fellow of the Royal Australasian College of Surgeons.

The position of Principal Medical Officer of Victoria prior to the war was a part-time appointment, but owing to the enormous amount of work thrown on the medical services in connexion with the formation and equipping of medical services resulting upon the formation of the Australian Imperial Force it was made a full-time appointment. Cuscaden was appointed Principal Medical Officer of the Third Military District and served in that position until February, 1918. His service was of a high order and he was promoted to the rank of colonel. In February, 1918, he was appointed Director-General of Medical Services, with the temporary rank of brigadier-general. General Cuscaden's administration as Director-General of Medical Services was eminently satisfactory, and on the cessation of hostilities he was prevailed upon to continue in the appointment until such time as someone could be selected to fill the position permanently.

As an indication of his responsibilities at this time it might be stated that at the time of the signing of the

Armistice there were twelve Australian general hospitals, thirty-four auxiliary hospitals and convalescent homes, three mental hospitals and many smaller institutions, including four artificial limb factories. As will be readily appreciated, the work carried out in these institutions, particularly during the period of demobilization, was extremely heavy, and the efficiency with which these establishments were managed reflects the highest credit upon Cuscaden. No organization so extensive as that demanded by the new conditions of demobilization existed before and a great amount of spade work had to be done. All his work Cuscaden carried out enthusiastically, especially during the period of strain caused by the extensive influenza epidemic and the outbreak of cerebro-spinal meningitis.

The efficiency of the medical services in Victoria was specially mentioned in the report of a committee of investigation which was appointed by the Minister of Defence to advise the Ministry on the state of the camps in Australia.

Major R. E. Williams said of him: "I found Sir George Cuscaden a most valuable and indefatigable colleague. He was hard working, conscientious and dependable, and always courteous and considerate. He was the man for the job."

Dr. Felix Meyer writes:

I first met George Cuscaden when he joined the outdoor staff of the Women's Hospital in 1896. For twelve years he was my assistant in the gynæcological theatre, and we had much work together in private practice. He was a loyal and helpful colleague, one who gave whole-hearted support to the work in hand. His judgement was sound, the result of experience and a strong sense of responsibility. Whether in hospital or private, it was for me a pleasure to work with him. On the Committee of the Women's Hospital his opinions always carried weight, and the interests of the hospital were safe in his hands. He was of a most kindly disposition and in full sympathy with his patients. Looking back to our association in the far past, I can recall nothing but the most pleasant memories.

ARTHUR FRANCIS LYNCH.

We are indebted to Dr. A. Benson for the following appreciation of the late Dr. Arthur Francis Lynch.

By the death of Arthur Francis Lynch on February 17, 1933, Adelaide has lost one of its best known and most popular practitioners. He was born in Adelaide in 1867 and was educated at the Christian Brothers' College, where he distinguished himself. He graduated M.B., B.S., at Adelaide in 1889, being one of five, the first batch of medical students registered in Adelaide. In 1927 he was elected a Fellow of the Royal Australasian College of Surgeons. He did excellent work as Medical Officer of the Northern Territory of Australia, to which office he was subsequently appointed. Alfred Searcy, in his book on the Northern Territory, referred to him in glowing terms. Few men, he said, could have stood up to the many hardships he was called upon to face, travelling at times hundreds of miles, chiefly on horseback, and camping out in the way-back country. He was indeed a pioneer of bush doctoring, travelling the length and breadth of the country, gaining the confidence, admiration and respect of the settlers, squatters and aborigines. It seems a pity that he had never been induced to write a book on his life in the Northern Territory of Australia.

Lynch had many hair-breadth escapes and met with many minor accidents. It was delightful to listen to his experiences when he did feel the inclination to recall them; in fact, nothing could have been more entertaining. Even at this stage of his young life he showed himself up as a big man in every sense of the word. Combating difficulties with wonderful resource, and never shirking his job, Arthur Lynch's name will ever remain a lasting memory of old Territorians, and his name is revered from Port Darwin to the back wilds of a difficult and very often inhospitable country. It is difficult to find out how many years he resided there, but in all probability it was about six.

After leaving the Territory he decided to see something of the Far East and accepted an appointment as surgeon to the E. and A. Company of mail boats travelling between Australia and those countries. That he was always popular was proved by the fact that the company sincerely regretted his resignation, but it was as well perhaps that he did resign, because soon after his marriage he was offered another ship on the understanding that his wife should accompany him. Although he was much inclined to accept, he refused at the behest of his wife. The ship was subsequently lost with all hands.

Lynch commenced general practice in Adelaide in 1898, where he gained a large and lucrative practice and never looked back. In 1899 he was appointed honorary pathologist to the Adelaide Hospital and performed hundreds of *post mortem* examinations in that capacity, in addition to *post mortem* examinations for coronial inquiries up to the time of his death. A leading King's Counsellor states that he was the best medical witness he ever had the honour of

examining: thorough, concise, never misleading, but always fair and just.

In 1906 he was appointed honorary assistant gynæcologist to the Adelaide Hospital, and with the late J. A. G. Hamilton carried on until 1919, when he succeeded to the senior position. His practice at this time had so increased, and his health not being robust, in 1920 he resigned, as he felt he was unable to do justice to both his private practice and the position of gynæcologist at the hospital.

Professor Archibald Watson held Lynch in high regard. They were staunch friends and worked together for many years. To "Watty", Lynch's death must have been a great blow, and although about eighty-three years old today, Professor Watson could recount the many excellent qualities of his great friend.

Lynch possessed many fine qualities, being deeply religious, but he did not parade it. He was an excellent host and indulgent husband and father. The sudden death of his eldest son affected him very deeply and left its mark on him. He never appeared to have fully recovered from the shock, and it seemed the beginning of the end. He was a handy man about the house; in fact, he seemed to possess all-round talents and was ever helpful in giving effect to them.

He was very interested in racing and raced horses with varied success. For twenty years he sat on the Committee of the Port Adelaide Racing Club, proving an able administrator; his ideas were always fruitful, and by his death the club has lost a committeeman of whom it was proud.

During the war period he was attached to the Home Service with the rank of major, and it was in volunteering for active service abroad that he discovered he was suffering from diabetes, this rendering him ineligible.

Lynch possessed a most kindly and charming disposition, an even temperament, was hospitality itself, and devoted most of his life to the earnest consideration of others. He was an excellent judge of human nature, gaining the confidence of his patients by a happy genial manner. Often, with a merry twinkle in his eye, he would place the most nervous immediately at their ease by recounting a pretty little story which he could tell very well indeed. Undoubtedly an excellent *raconteur*, he made the best of a large field of experience in many parts of the world, particularly the Far East, where he travelled extensively.

Although few knew it, Lynch was an excellent pianist, loved music, and was always present at the first night of any performance of note. He left a widow, two daughters and one son.

ROBERT HUMPHERY.

We regret to announce the death of Dr. Robert Humphery, which occurred on April 8, 1933, at Adelaide, South Australia.

University Intelligence.

THE UNIVERSITY OF SYDNEY.

A meeting of the Senate of the University of Sydney was held on April 3, 1933.

The Diploma in Public Health was awarded to Donald Augustus Dowling, M.B., B.S. (Adelaide).

The resignation of Dr. E. W. Fairfax, Lecturer in Clinical Medicine at Royal Prince Alfred Hospital, was accepted with regret.

Sir Mungo MacCallum, K.C.M.G., was reelected as Deputy Chancellor for the year 1933-1934.

The following appointments were approved: Dr. J. K. Maddox as Tutor in Medicine at the Royal Prince Alfred Hospital; Dr. S. A. Smith as Lecturer in Clinical Medicine at the Royal Prince Alfred Hospital; Mr. L. W. O. Martin, B.Sc., and Mr. E. P. Sandford, B.Sc., as half-time Demonstrators in Chemistry; Dr. C. H. Horsley, B.Sc., Miss W. R. Mankin, M.Sc., and Mr. H. D. M. Hercus, B.Sc., as part-time Demonstrators in Physiology.

Mr. H. M. Gordon, B.V.Sc., was reappointed to the Walter and Eliza Hall Research Fellowship in Veterinary Science.

Science Research Scholarships were awarded to Mr. S. W. Carey, B.Sc. (Geology), Miss Alma G. Culey, B.Sc. (Geology), Mr. F. P. J. Dwyer, B.Sc. (Chemistry), and Mr. R. S. C. Pitt, B.Sc. (Electrical Engineering).

It was resolved to admit Mr. P. Brough, M.A., B.Sc., B.Sc.Agr., to the degree of Doctor of Science for his thesis entitled "Contributions to the Life History of Australian Angiosperms—The Life History of *Grevillea robusta*" and supporting papers. The examiners, Professor J. C. Chamberlain (University of Chicago), Professor R. S. Adamson (University of Cape Town), and Professor T. G. B. Osborn (University of Sydney) expressed high appreciation of the value of the thesis submitted as an original contribution of distinguished merit adding to the knowledge and understanding of botany. (Mr. Brough, who is Lecturer and Demonstrator in Botany at the University of Sydney, is a graduate of the University of Glasgow, of which he holds the degrees of Master of Arts, Bachelor of Science and Bachelor of Science in Agriculture. His main field in original research has been in the morphology of flowering plants.)

It was resolved to submit the names of Mr. S. E. Williams, M.Sc., Mr. D. E. White, M.Sc., and Mr. N. A. Burges, B.Sc., in that order, to the Royal Commissioners of the Exhibition of 1851 as worthy of the award of a Science Research Scholarship.

It was resolved that the scheme in force in 1932 in regard to the courses for the Diploma in Education be continued for the present year.

Correspondence.

AN ECONOMIC COMMENTARY AND DIAGNOSIS.

Sir: I wish to commend the very able letter of "M.B., Ch.B." in support of the Douglas Social Credit Proposals.

Whilst many of the members of our profession have studied and approved of the proposals, the majority seems content to leave the economic problem to the politicians and professors of economic science.

If there were any general agreement of opinion, as regards the diagnosis, prognosis and treatment, amongst these experts, we might do well to "stick to our lasts" and leave the case to them.

But a study of economic science reveals nothing but a confusion of economic thought and we are treated to the most astounding contradictions; the so-called "laws" have ceased to operate and we are forced to the conclusion that the economists have failed in their task of understanding the processes of wealth production and distribution.

They wrangle with one another over secondary matters and offer as diagnoses learnedly dressed descriptions of the symptoms, such as lack of confidence, fall in prices, the movements of gold *et cetera*. And, occasionally, when they manage to break through the mutual contradictions that arise from attention to the symptoms only and venture a pronouncement on policy, it is generally advice quite irrelevant to the economic realities of the problem.

We have hundreds of thousands of unemployed; we see our industries slowly vanishing in bankruptcy, our primary producers forced to sell below the cost of production and, worse even than these, our children, on the threshold of life, facing a world almost empty of hope or opportunity.

It is not only a challenge to our intelligence; it is a challenge to our manhood and we must take it up.

Major Douglas was a costing expert for the Government during the war and is a civil engineer of world experience; his first book, "Economic Democracy", and sequels predicted the course of events with remarkable accuracy.

His followers are now numbered by the million and their activity will go on increasing until the proposals are adopted and the community is enabled to secure the full fruits of its economic achievements.

All serious students of the world problem admit that there is an abundance of real wealth (that is, goods and services) and few will deny that produce and productive capacity are wasted because this real wealth cannot be distributed except at a financial loss.

Money is the only effective demand for goods and it must be obvious that our obsolete monetary system stands like a bottle-neck between production and consumption: producers want to produce but cannot sell, consumers want to consume but cannot buy! Yet our professors and administrators drum the old fairy tale into our ears, that money is merely a mechanism which reflects the real economic situation.

Douglas has thrown the searchlight of his genius on these problems and his analysis shows the effect of over-saving and investment in intensifying the selling problem; going on, it shows the disproportionate amount of monetary income which goes into creating fixed capital; and, digging deeper, it shows how the growth of bank-credit as a means of financing capital production is evidence that this production can only in small part be effected by the monetary savings of the community.

Some new form of money had therefore to be devised and this is the accountancy money known as "credit", quite valid and theoretically indefinitely expansible.

This forms at least nine-tenths of the money in existence and as the Right Honourable Reginald McKenna has shown, it can be created and destroyed by the banking system at will, so long as a stable community exists producing and consuming a reasonable quantity of goods.

The real credit of a nation is its productive capacity; and financial credit — its translation into money — is the undoubted prerogative of the people to whom it really belongs, yet we have given away this power to a private system trading for profit and we allow this system to dole out our own money (credit) to us at interest.

All industry is practically financed by bank loans and it ticks up costs and prices; for it has to be recovered through the latter in order that it may be repaid.

Owing to this credit being withdrawn and cancelled, on the principle that it is a "loan", it ceases to function as purchasing power before all the costs it has ticked up have been met.

The result is that the prices of goods are always more than the purchasing power available to meet them. This "gap" was masked in the past by the issue of fresh loans but, when industry ceased to expand and exports ceased to be profitable, the inherent defect of our system became manifest, that is, that industry does not distribute sufficient purchasing power to buy the whole of its production. In order to carry on, industry has had to incur greater and greater indebtedness to the banks and now the nation's debt against its physical equipment reaches almost astronomical figures.

The Douglas analysis shows that what is required is not necessarily an increase of credit but a method which administers credit as the money equivalent of the community's economic achievements—a totally different thing from nationalization of banking or socialism.

Money would be socialized and further socialization would cease to have any claim to be regarded as essential to social justice.

Under the Douglas system money would be created at the rate at which goods are produced, and it would be cancelled at the rate at which they are consumed; and this is the only rational method of operating a money system. The ownership of credit would originate with the consumer and pass over to the producer in exchange for his goods; it should not originate with a third party, the banks, any more than it should originate with the producer, who would then have both the money and the goods.

The community's credit would be distributed partly through price reduction; and the increasing displacement of human labour by science necessitates that part of it should be distributed by the issue of an unconditional national dividend.

Our present financial and economic system is based on the workings of a pre-scientific age, and the Douglas proposals traverse every canon of what is called "sound finance", but which in reality is not "sound economics".

Sound finance can only conceive such futile variations in monetary policy as stabilization, inflation or deflation, and it has no way of equating purchasing power with production.

The Douglas proposals are sound and sane and could be immediately applied without any serious disturbance of our way of life; they retain all the benefits of private ownership and control of industry, whilst they confer all the benefits that the socialists dream about.

The profession will be well advised not to accept as gospel the biased and frequently untrue statements that are being issued by the grandiloquently—not to say impudently—named "Australian Economic Advisory Council"; it is a self-appointed body whose name is a "bluff" which gives the impression of some official standing.

Its circular, issued a few weeks after it appointed itself, tries by misrepresentation to maintain what the late Lord Melchett called the greatest "bluff" in the history of the world—the money "bluff".

It announces that it gave the Douglas scheme "thorough consideration". A few men of Einstein's mental calibre—if they had nothing else to do—might be able to do this in a week or two; but there is no evidence of the possession of this mental acuity by the personnel of the Australian Economic Advisory Council.

It takes many months for people of ordinary intelligence, like myself, to get even a good grasp of the Douglas teachings and I strongly commend the study of Douglas's own works to your readers, not only for the welfare of the Commonwealth, not only for humanitarian reasons, but for the protection of their own interests. No repudiation —no inflation—no poverty.

Yours, etc.,

J. E. STREETER,

President, Douglas Social Credit Association of Queensland.

T. and G. Building,
Queen Street,
Brisbane,
March 20, 1933.

MODERN OPTOMETRY.

SIR: The tirade of Mr. A. Knapp (March 11, 1933) against the body of "so-called ophthalmologists" would appear to have been called forth by their neglect to recognize his "professional status". Had he taken the trouble to gain possession of a registrable diploma in medicine and surgery, all cause for his grievance would have vanished. Not wishing to do this, he attempts to clothe the practice of refraction with a cloak of mystery by giving it the high-sounding title of "optometry"! As an "optometrist", he, *ipso facto*, possesses occult powers denied to the "ophthalmologist".

Comment on his statement that "wherever ophthalmologists are found, their refraction work is usually poor and not infrequently very bad" is superfluous. His further remark that the British Medical Association in England "just issued a circular calling for volunteers who were willing to do this work of sight-testing" is misleading. The national Ophthalmic Treatment Board was instituted by the British Medical Association for the purpose of providing glasses for the intermediate patient at a moderate fee. One and a half or two guineas (I am not sure of the exact amount) provides for the attention of an oculist and a pair of glasses. The patient is free to choose from a roster of medical men, all of whom have produced tangible evidence that they have had ample experience in the estimation of errors of refraction.

Finally, Sir, as a member of the British Medical Association, I do not think that the pages of THE MEDICAL JOURNAL OF AUSTRALIA should be sullied with a letter of the type of Mr. Knapp's. If we are to take his letter as a sample of the mental pabulum offered by the editorial staff, the journal is not worth the paper it is printed on.

Yours, etc.,

KEVIN O'DAY.

2, Collins Street,
Melbourne,
March 10, 1933.

Books Received.

DISEASES OF THE EYE (PRACTITIONER'S SERIES), by A. Rugg-Gunn, M.B., F.R.C.S.; 1933. London: William Heinemann (Medical Books) Limited. Foolscap 4to., pp. 199, with illustrations. Price: 12s. 6d. net.

WORKMEN'S COMPENSATION: ITS MEDICAL ASPECT, by Sir John Collie, C.M.G., D.L., M.D.; 1933. London: Edward Arnold and Company. Demy 8vo., pp. 167. Price: 7s. 6d. net.

A SHORT HISTORY OF SURGERY, by Sir D'A. Power, K.B.E., F.R.C.S.; 1933. London: John Bale, Sons and Danielsson. Crown 8vo., pp. 91. Price: 3s. 6d. net.

A DOCTOR TO A MOTHER: THE MANAGEMENT OF MATERNAL AND INFANT HEALTH, by E. Holland, M.D., F.R.C.S., F.R.C.P., F.C.O.G., R. C. Jewesbury, M.D., F.R.C.P., and W. Sheldon, M.D., M.R.C.P.; 1933. London: Edward Arnold and Company. Crown 8vo., pp. 96. Price: 1s. 6d. net.

MODERN BIRTH CONTROL METHODS OR HOW TO AVOID PREGNANCY, by G. R. Scott, F.Ph.S., F.Z.S., with foreword by Sir W. A. Lane; 1933. London: John Bale, Sons and Danielsson, Limited. Crown 8vo., pp. 219. Price: 7s. 6d. net.

FOOD IN HEALTH AND DISEASE: PREPARATION, PHYSIOLOGICAL ACTION AND THERAPEUTIC VALUE, by K. M. Thoma, B.A.; 1933. Philadelphia: F. A. Davis Company. Demy 8vo., pp. 370.

PROCEDURES IN TUBERCULOSIS CONTROL FOR THE DISPENSARY, HOME AND SANATORIUM, by B. Goldberg, M.D., F.A.C.P., F.A.P.H.A., with a Chapter on Sanatorium Planning by T. B. Kidner, and Introduction by D. J. Davis, M.D., Ph.D.; 1933. Philadelphia: F. A. Davis Company. Royal 8vo., pp. 373, with 54 illustrations. Price: $4.00 net.

ACIDOSIS AND ALKALOSIS, by S. Graham, M.D., F.R.F.P.S., and N. Morris, M.D., B.Sc., D.P.H., F.R.F.P.S.; 1933. Edinburgh: E. and S. Livingstone. Crown 8vo., pp. 215, with illustrations. Price: 7s. 6d. net.

CALCIUM METABOLISM AND CALCIUM THERAPY, by A. Cantarow, M.D., with foreword by H. A. Hare, B.Sc., M.D., LL.D.; Second Edition; 1933. Philadelphia: Lea and Febiger. Demy 8vo., pp. 364. Price: $3.50 net.

EPIDEMIOLOGY IN RELATION TO AIR TRAVEL, by A. Massey, M.D., D.P.H.; 1933. London: H. K. Lewis and Company, Limited. Demy 8vo., pp. 68, with five maps. Price: 7s. 6d. net.

CARDIOVASCULAR PAIN AS A BIOCHEMICAL PROBLEM, by G. Lambert, B.A., M.D., B.C., with foreword by M. A. Cassidy, C.B., M.A., M.D., F.R.C.P.; 1933. London: H. K. Lewis and Company, Limited. Royal 8vo., pp. 86, with 23 illustrations. Price: 6s. net.

FAVOURITE PRESCRIPTIONS, INCLUDING DOSAGE TABLES, ETC., HINTS FOR TREATMENT OF POISONING AND DIET TABLES, by E. Ward, M.D.; Third Edition; 1933. London: J. and A. Churchill. Foolscap 8vo., pp. 156. Price: 7s. 6d. net.

FEET IN HEALTH AND DISEASE, by R. R. Hayhow, M.I.S.Ch.; 1933. London: John Bale, Sons and Danielsson, Limited. Crown 8vo., pp. 48, with illustrations.

Diary for the Month.

Apr. 18.—New South Wales Branch, B.M.A.: Ethics Committee.
Apr. 19.—Western Australian Branch, B.M.A.: Branch.
Apr. 20.—New South Wales Branch, B.M.A.: Clinical Meeting.
Apr. 21.—Queensland Branch, B.M.A.: Council.
Apr. 27.—South Australian Branch, B.M.A.: Branch.
Apr. 27.—New South Wales Branch, B.M.A.: Branch.
May 1.—New South Wales Branch, B.M.A.: Organization and Science Committee.
May 2.—Western Australian Branch, B.M.A.: Council.
May 2.—Victorian Branch, B.M.A.: Branch.
May 4.—South Australian Branch, B.M.A.: Council.
May 5.—Queensland Branch, B.M.A.: Branch.
May 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
May 12.—Queensland Branch, B.M.A.: Council.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xx.

Broken Hill and District Hospital, New South Wales: Surgeon Superintendent, Junior Resident Medical Officer.

Mater Misericordiæ Children's Hospital, Brisbane, Queensland: Resident Medical Officer.

The New South Wales Community Hospital, Sydney: Honorary Ophthalmologist.

Medical Appointments: Important Notice.

Medical practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
New South Wales: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
Victorian: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
Queensland: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associated Friendly Societies' Medical Institute. Toowoomba Associated Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their agreement to the Council before signing. Lower Burdekin District Hospital, Ayr.
South Australian: Secretary, 207, North Terrace, Adelaide.	Combined Friendly Societies, Clarendon and Kangarilla districts. All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
Western Australian: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
New Zealand (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Editorial Notices.

Manuscripts forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to The Medical Journal of Australia alone, unless the contrary be stated.

All communications should be addressed to "The Editor", The Medical Journal of Australia, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 3651-2.)

Subscription Rates.—Medical students and others not receiving The Medical Journal of Australia in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £1 for Australia and £1 6d. abroad *per annum* payable in advance.